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July 15, 2011

Ms. Polly Chapman
P.O. Box 2490
31301 Highway 3
Weaverville, CA 96093

Re: Traffic Signalization Study

Dear Ms. Chapman:

This letter report provides traffic operations analysis results for the SR 299 (Main Street) corridor through Weaverville, California. The following timeframes were studied:

- Existing Conditions
- 2009 Conditions (with East Connector)
- 2040 Conditions (with East Connector)

Existing intersection turning movement counts were collected in July 2009. Intersection turning movement volumes were developed for 2009 and 2040 conditions (with East Connector), using the Trinity County travel demand model.

The purpose of this study is to develop intersection improvements on SR 299 in Weaverville that work efficiently as a system. **A summary of the analysis results is provided in the tables on pages 14, 15, and 16. A summary of the findings and recommendations is provided on page 16.**

This analysis also looks at the effects of converting Center Street between Court Street and SR 3 from a one-way section to a two-way section.

STUDY INTERSECTIONS AND ANALYSIS SCENARIOS

The following study intersections along the SR 299 (Main Street) corridor were analyzed:

1. SR 299/Glen Road-East Connector
2. SR 299/Washington Street
3. SR 299/SR 3 (Trinity Lake Boulevard)
4. SR 299/Garden Gulch Street-Forest Avenue

Intersection level of service, vehicle queuing, travel time, and greenhouse gas emissions analyses were performed for the SR 299 corridor assuming three scenarios.

- Unsignalized Intersections – The study intersections were analyzed under existing conditions based on intersection turning movement counts collected in July 2009.

- Signalized Intersections – The SR 299 corridor was analyzed assuming the four study intersections are signalized under 2009 conditions (with East Connector) and 2040 conditions (with East Connector).

- Signalized and Roundabout Intersections - The SR 299 corridor was analyzed assuming the SR 299/Glen Road-East Connector and SR 299/Garden Gulch Street-Forest Avenue intersections are roundabouts, and the SR 299/Washington Street and SR 299/SR 3 intersections are signalized. 2009 conditions (with East Connector) and 2040 conditions (with East Connector) were analyzed.

The SR 299/Glen Road-East Connector intersection was also analyzed as an unsignalized (side street stop controlled) intersection under 2009 conditions (with East Connector) and 2040 conditions (with East Connector) and compared to the Trinity County level of service thresholds.

ANALYSIS METHODOLOGY

Signal Warrants

The Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) provides Four Hour and Peak Hour signal warrants, which are commonly used to determine if an intersection is in need of a traffic signal.

According to the MUTCD, the Four Hour signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The Four Hour warrant compares the traffic volumes from any four hours of an average day on the major street (total of both directions) to the corresponding vehicle volume on the higher-volume minor street approach (one direction only).

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of one hour of an average day, the minor street traffic suffers undue delay when entering or crossing the major street. (MUTCD) The Peak Hour warrant compares the traffic volumes for one hour of an average day on the major street (total of both directions) to the corresponding vehicle volume on the higher-volume minor street approach (one direction only).

The MUTCD provides separate signal warrants for urban and rural areas. For communities with a population of less than 10,000, the rural area signal warrant criteria should be applied. The Weaverville population is less than 10,000, therefore the rural area criteria was applied.

Intersection Analysis

Transportation engineers and planners commonly use the term level of service (LOS) to measure and describe the operational status of the local roadway network. An intersection or roadway segment's level of service can range from LOS A (indicating free-flow traffic conditions with little or no delay), to LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays).

<u>Signalized Intersections</u>

The level of service at signalized intersections was determined using the methodology contained in Chapter 16 of the *Highway Capacity Manual* (*HCM) 2000*. The *HCM 2000* methodology

determines the level of service at signalized intersections by comparing the average control delay for all vehicles approaching the intersection to the delay thresholds shown in **Table 1**.

Unsignalized Intersections

Unsignalized (side-street stop controlled) intersection level of service analysis was performed using the methodology in Chapter 17 of *HCM 2000*. The *HCM 2000* methodology determines the level of service at unsignalized intersections by comparing the average control delay for each individual movement to the delay thresholds shown in **Table 1**.

TABLE 1
INTERSECTION LEVEL OFSERVICE DEFINITIONS

Level of Service	Description	Signalized Intersections (Average Control Delay) [1]	Unsignalized Intersections (Average Control Delay) [2]
A	Represents free flow. Individual users are virtually unaffected by others in the traffic stream.	≤ 10	≤10
B	Stable flow, but the presence of other users in the traffic stream begins to be noticeable.	> 10 to 20	> 10 to 15
C	Stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream.	> 20 to 35	> 15 to 25
D	Represents high-density, but stable flow.	> 35 to 55	> 25 to 35
E	Represents operating conditions at or near the capacity level.	> 55 to 80	> 35 to 50
F	Represents forced or breakdown flow.	> 80	> 50

Sources:
[1] *HCM 2000*, Chapter 16, Signalized Intersections. Values shown are in seconds/vehicle.
[2] *HCM 2000*, Chapter 17, Unsignalized Intersections. Values shown are in seconds/vehicle.

Level of Service Thresholds

The Trinity County Regional Transportation Plan (RTP) (2010) identifies level of service thresholds for roadways and intersections within the county. The RTP states:

> *The minimum acceptable Level of Service (LOS) standard for county roadway and intersection operation in the Weaverville Community Plan Area is "D". For unsignalized intersections, LOS is calculated based upon the average peak hour delay for the worst approach (using the current version of the Highway Capacity Manual). No public highway or roadway within the Weaverville Community Plan Area should be allowed to fall to or below LOS "E".*

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CORRIDOR ANALYSIS

Signal Warrant Analysis

The Four Hour and Peak Hour signal warrants were analyzed for each of the study intersections based on the existing intersection turning movement volumes (from counts collected in July 2009) and the 2040 model volumes (with East Connector). **Table 2** shows the results of the signal warrant analysis. The technical analysis is provided in the **Attachment A**.

TABLE 2
SIGNAL WARRANT ANALYSIS RESULTS

Intersection	Warrant Met? (Yes/No)			
	Existing Conditions		2040 Conditions (with East Connector)	
	Four Hour Warrant	Peak Hour Warrant	Four Hour Warrant	Peak Hour Warrant
SR 299/Glen Road-East Connector	Yes*	Yes*	Yes	Yes
SR 299/Washington Street	Yes	No	Yes	Yes
SR 299/SR 3	No	No	Yes	Yes
SR 299/Garden Gulch Street	No	No	No	No

Notes: * Based on 2009 Conditions (with East Connector) traffic volumes.
Source: Fehr & Peers, 2011

As shown in **Table 2**, the SR 299/Glen Road-East Connector intersection passes the Four Hour and Peak Hour signal warrants under 2009 conditions (with East Connector) and 2040 conditions (with East Connector). The SR 299/Washington Street intersection passes the Four Hour signal warrant, but not the Peak Hour signal warrant under existing conditions (based on the existing intersection turning movement counts). The SR 299/SR 3 intersection meets the Four Hour and Peak Hour signal warrants under 2040 conditions (with East Connector). The SR 299/Garden Gulch intersection does not meet traffic signal warrant criteria under any condition.

Scenario 1: Unsignalized Intersections

Scenario 1 analyzes the SR 299 corridor with side street stop controls at the study intersections. Existing conditions, 2009 conditions (with East Connector), and 2040 conditions (with East Connector) traffic volumes were analyzed under this scenario.

Level of Service

Level of service analysis was performed at the study intersections using Synchro Version 6.0 software. The existing conditions analysis is based on intersection turning movement volumes collected in July 2009. The 2009 conditions (with East Connector) and 2040 conditions (with East Connector) traffic volumes were determined using the travel demand model. **Table 3** shows the level of service results with unsignalized study intersections. The technical analysis is provided in the **Attachment B**.

TABLE 3
LEVEL OF SERVICE RESULTS (UNSIGNALIZED INTERSECTIONS)

Intersection	Control Type[1]	PM Peak					
		Existing Conditions		2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
		Delay[2]	LOS	Delay[2]	LOS	Delay[2]	LOS
SR 299/Glen Road	SSSC	24.7	C	--	--	--	--
SR 299/Glen Road-East Connector	SSSC	--	--	**42.8**	**E**	**80.3**	**F**
SR 299/Washington Street	SSSC	**44.0**	**E**	27.8	D	**128.1**	**F**
SR 299/SR 3	SSSC	16.7	C	17.2	C	15.7	C
SR 299/Garden Gulch Street	SSSC	20.9	C	22.9	C	29.7	D

Notes: [1] SSSC = Side Street Stop Control
[2] Delay is reported in seconds per vehicle for the worst movement for unsignalized intersections.

Source: Fehr & Peers, 2011

The side street approach of the SR 299/Washington Street intersection operates at an unacceptable level of service under existing conditions. When the East Connector is constructed, a significant amount of existing traffic will shift from Washington Street to the East Connector, improving the level of service at the SR 299/Washington Street intersection to LOS D, but diminishing the level of service at the SR 299/Glen Road-East Connector intersection to LOS E under 2009 conditions. The analysis indicates that if the East Connector is constructed without a traffic signal at SR 299, the intersection will not meet the Trinity County LOS standard.

Under 2040 conditions, two of the four study intersections will operate at unacceptable levels of service with unsignalized intersections.

Travel Time Through Corridor

The time it takes a vehicle to travel from one end of the SR 299 corridor to the other was analyzed using SimTraffic micro-simulation software. For the purposes of this analysis the corridor is defined as the section between the SR 299/Martin Street intersection and the SR 299/ Garden Gulch Street-Forest Avenue intersection. The total corridor length is approximately 1.25 miles. **Table 4** shows the travel time results for the corridor with unsignalized study intersections.

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TABLE 4
TRAVEL TIME THROUGH SR 299 CORRIDOR (WITH UNSIGNALIZED INTERSECTIONS)

Direction of Travel	Travel Time		
	Existing Conditions	2009 Conditions (with East Connector)	2040 Conditions (with East Connector)
Northbound	2.9 minutes	3.1 minutes	3.1 minutes
Southbound	3.4 minutes	3.4 minutes	3.4 minutes

Notes: The analysis includes the section of SR 299 between the SR 299/Martin Street and SR 299/Garden Gulch Street-Forest Avenue intersections.
Source: Fehr & Peers, 2011

The total travel time through the corridor with unsignalized intersections ranges from approximately 3 to 3 ½ minutes for the three study timeframes.

Greenhouse Gas Emissions

Greenhouse gas emissions were analyzed using Synchro software. Carbon monoxide, nitrogen oxides, and volatile organic compound emissions were analyzed at the study intersections. The emissions results are shown in **Table 5**. The technical analysis is provided in the **Attachment B**.

TABLE 5
GREENHOUSE GAS EMISSIONS RESULTS (WITH UNSIGNALIZED INTERSECTIONS)

Intersection	Emissions[1]					
	Existing Conditions			2040 Conditions (with East Connector)		
	CO	NO_X	VOC	CO	NO_X	VOC
SR 299/Glen Road-East Connector	1.02	0.20	0.24	1.13	0.22	0.26
SR 299/Washington Street	1.40	0.27	0.33	0.74	0.14	0.17
SR 299/SR 3	0.80	0.16	0.19	0.50	0.10	0.12
SR 299/Garden Gulch Street	0.52	0.10	0.12	0.58	0.11	0.13

Notes: [1] CO = Carbon Monoxide, NO_X = Nitrogen Oxides, VOC = Volatile Organic Compounds
Emissions reported in kilograms (for the peak hour).
Source: Fehr & Peers, 2011

Scenario 2: Signalized Intersections

Scenario 2 analyzes the SR 299 corridor assuming the study intersections are signalized. 2009 conditions (with East Connector) and 2040 conditions (with East Connector) traffic volumes were analyzed under this scenario.

Level of Service

Intersection level of service was analyzed during the summer PM peak period for 2009 conditions (with East Connector) and 2040 conditions (with East Connector) using Synchro software. **Table 6** shows the level of service results assuming the study intersections are signalized. The technical analysis is provided in the **Attachment C**.

TABLE 6
LEVEL OF SERVICE RESULTS (WITH SIGNALS)

Intersection	Control Type	2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
		PM Peak		PM Peak	
		Delay[1]	LOS	Delay[1]	LOS
SR 299/Glen Road-East Connector	Signal	13.7	B	13.9	B
SR 299/Washington Street	Signal	10.3	B	11.9	B
SR 299/SR 3	Signal	10.4	B	11.6	B
SR 299/Garden Gulch Street	Signal	11.8	B	15.3	B

Notes: [1] Delay is reported in seconds per vehicle for the overall intersection for signalized intersections.
Source: Fehr & Peers, 2011

As shown in the table, the study intersections operate at LOS B with traffic signals under 2009 and 2040 conditions (with East Connector).

Vehicle Queuing

Vehicle queuing along the SR 299 corridor was analyzed using SimTraffic micro-simulation software. **Table 7** shows the vehicle queuing results at the study intersections. The average and maximum queues are shown for each approach of the intersection. The technical analysis is provided in the **Attachment C**.

TABLE 7
VEHICLE QUEUING RESULTS (WITH SIGNALS)

Intersection	Intersection Approach	Distance to Closest Intersection (feet)[1]	2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
			PM Peak Queue Lengths		PM Peak Queue Lengths	
			Average feet (cars[2])	Maximum feet (cars[2])	Average feet (cars[2])	Maximum feet (cars[2])
SR 299/Glen Road-East Connector	NB	960	70 (3)	170 (7)	90 (4)	230 (10)
	SB	460	60 (3)	180 (8)	75 (3)	205 (9)
	EB	230[3]	50 (2)	115 (5)	60 (3)	130 (6)
	WB	N/A	35 (2)	85 (4)	40 (2)	95 (4)
SR 299/Washington Street	NB	540	55 (3)	180 (8)	90 (4)	290 (12)
	SB	355	65 (3)	170 (7)	90 (4)	255 (11)
	EB	690	30 (2)	65 (3)	30 (2)	70 (3)
	WB	775	25 (1)	75 (3)	50 (2)	120 (5)
SR 299/SR 3	NB	225	70 (3)	200 (8)	75 (3)	210 (9)
	SB	530	40 (2)	95 (4)	50 (2)	140 (6)
	WB	280	35 (2)	80 (4)	40 (2)	95 (4)
SR 299/Garden Gulch Street	NB	230	35 (2)	125 (5)	40 (2)	140 (6)
	SB	175	50 (2)	150 (6)	65 (3)	170 (7)
	EB	295	20 (1)	55 (3)	25 (1)	60 (3)
	WB	1230	30 (2)	75 (3)	35 (2)	80 (4)

Notes: [1] Distance estimated using Google Maps.
[2] The vehicle queue length was calculated assuming an average car length of 25 feet. A queue length of 5-25 feet is considered one vehicle, 26-50 feet is two vehicles, etc. The queuing results are also a product of a simulation that is designed to represent "real-life" drivers to the best extent possible. Therefore, each simulation run represents a unique set of data. An average of 10 runs is shown in the results table.
[3] This is the distance to Fairway Drive. Nugget Lane is marked "Keep Clear" and was therefore excluded. Analysis performed assuming the SR 299 corridor is the North-South direction.

Source: Fehr & Peers, 2011

The vehicle queues are not expected to spill back into adjacent intersections. Vehicle queues at the study intersections are only expected during the peak traffic periods and dissipate quickly.

Travel Time Through Corridor

Travel time through the SR 299 corridor was analyzed for 2009 conditions and 2040 conditions assuming construction of the East Connector road is complete and the study intersections are signalized. The results are shown in **Table 8**. The technical analysis is in the **Attachment C**.

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TABLE 8
TRAVEL TIME THROUGH SR 299 CORRIDOR (WITH SIGNALS)

Direction of Travel	Travel Time	
	2009 Conditions (with East Connector)	2040 Conditions (with East Connector)
Northbound	4.2 minutes	4.3 minutes
Southbound	3.8 minutes	3.9 minutes

Notes: The analysis includes the section of SR 299 between the SR 299/Martin Street and SR 299/Garden Gulch Street-Forest Avenue intersections.
Source: Fehr & Peers, 2011

The total travel time through the corridor, with traffic signals at the study intersections, is approximately 4 minutes, which is an increase of ½ -1 ½ minute over the existing travel time.

Greenhouse Gas Emissions

Greenhouse gas emissions were analyzed using Synchro software. Carbon monoxide, nitrogen oxides, and volatile organic compound emissions were analyzed at the study intersections. The emissions results are shown in **Table 9**. The technical analysis is provided in the **Attachment C**.

TABLE 9
GREENHOUSE GAS EMISSIONS RESULTS (WITH SIGNALS)

Intersection	Emissions[1]					
	2009 Conditions (with East Connector)			2040 Conditions (with East Connector)		
	CO	NO_X	VOC	CO	NO_X	VOC
SR 299/Glen Road-East Connector	1.01	0.20	0.23	1.14	0.22	0.27
SR 299/Washington Street	0.56	0.11	0.13	0.88	0.17	0.20
SR 299/SR 3	0.50	0.10	0.12	0.65	0.13	0.15
SR 299/Garden Gulch Street	0.58	0.11	0.13	0.70	0.14	0.16

Notes: [1] CO = Carbon Monoxide, NO_X = Nitrogen Oxides, VOC = Volatile Organic Compounds
Emissions reported in kilograms (for the peak hour).
Source: Fehr & Peers, 2011

The 2009 conditions (with East Connector) greenhouse gas emissions increase at some intersections and decrease at some intersections compared to existing conditions analysis results because the traffic volumes at the intersections change due to the East Connector. Therefore, the existing conditions and 2009 conditions (with East Connector) analysis results cannot be compared directly because the scenarios do not share a common baseline.

The 2040 conditions (with East Connector) with signalized intersections emissions results increase at all of the study intersections compared to the 2040 conditions with unsignalized intersections emissions results. The traffic volumes at the study intersections were the same for both scenarios. The traffic signals increased the emissions at the study intersections by small amounts (less than 0.20 kilograms). The emissions increase at the study intersections under the signals scenario due to additional stopping and accelerating of through traffic on SR 299. Without a traffic signal, the through movements on SR 299 are freely flowing and do not have to stop and start at intersections.

Vibration Analysis

A Traffic Vibration Assessment was performed by Bollard Acoustical Consultants, Inc. to determine if installing traffic signals at the study intersections would increase noise and roadway vibration caused by heavy trucks. The concern is that heavy trucks will have to stop along SR 299, where there are currently no controls, increasing vibration and noise to an unacceptable level. The analysis shows that traffic signals at the study intersections will not cause a significant increase in vibration along the SR 299 corridor. The Trinity County Intersection Improvement Traffic Vibration Assessment report (Bollard Acoustical Consultants, Inc.) is provided in **Attachment E**.

Scenario 3: Signalized and Roundabout Intersections

Scenario 3 analyzes the SR 299 corridor assuming:

- Traffic signals at:
    - SR 299/Washington Street
    - SR 299/SR 3
- Roundabouts at:
    - SR 299/Glen Road-East Connector
    - SR 299/Garden Gulch Street

2009 conditions (with East Connector) and 2040 conditions (with East Connector) traffic volumes were analyzed under this scenario.

Level of Service

Table 10 shows the level of service results at the study intersections assuming traffic signals and roundabouts at the study intersections. The technical analysis is provided in **Attachment D**.

TABLE 10
LEVEL OF SERVICE RESULTS (WITH SIGNALS AND ROUNDABOUTS)

Intersection	Control Type	2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
		PM Peak		PM Peak	
		Delay[1]	LOS	Delay[1]	LOS
SR 299/Glen Road-East Connector	Roundabout	9.1	A	9.5	A
SR 299/Washington Street	Signal	10.3	B	11.9	B
SR 299/SR 3	Signal	10.4	B	11.6	B
SR 299/Garden Gulch Street	Roundabout	7.6	A	7.9	A

Notes: [1] Delay is reported in seconds per vehicle for the overall intersection for signalized and roundabout intersections.
Source: Fehr & Peers, 2011

As shown in the table, the study intersections operate at LOS B or better with roundabouts and traffic signals under 2009 and 2040 conditions (with East Connector).

Vehicle Queuing

Table 11 shows the vehicle queuing results at the study intersections. The average and maximum queues are shown for each approach of the intersection. The technical analysis is provided in the **Attachment D**.

TABLE 11
VEHICLE QUEUING RESULTS (WITH SIGNALS AND ROUNDABOUTS)

Intersection	Intersection Approach	Distance to Closest Upstream Intersection (feet)[1]	2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
			PM Peak Queue Lengths		PM Peak Queue Lengths	
			Average feet (cars[2])	Maximum feet (cars[2])	Average feet (cars[2])	Maximum feet (cars[2])
SR 299/Glen Road-East Connector	NB	960	50 (2)	120 (5)	60 (3)	145 (6)
	SB	460	45 (2)	130 (6)	50 (2)	135 (6)
	EB	230[3]	35 (2)	75 (3)	35 (2)	80 (4)
	WB	N/A	25 (1)	60 (3)	30 (2)	75 (3)
SR 299/Washington Street	NB	540	55 (3)	160 (7)	80 (4)	250 (10)
	SB	355	60 (3)	170 (7)	90 (4)	220 (9)
	EB	690	30 (2)	70 (3)	30 (2)	70 (3)
	WB	775	30 (2)	75 (3)	45 (2)	100 (4)
SR 299/SR 3	NB	225	65 (3)	180 (8)	80 (4)	200 (8)
	SB	530	40 (2)	95 (4)	50 (2)	145 (6)
	WB	280	35 (2)	80 (4)	40 (2)	95 (4)
SR 299/Garden Gulch Street	NB	230	15 (1)	60 (3)	25 (1)	80 (4)
	SB	175	30 (2)	80 (4)	35 (2)	95 (4)
	EB	295	15 (1)	50 (2)	20 (1)	70 (3)
	WB	1230	10 (1)	55 (3)	15 (1)	60 (3)

Notes: [1] Distance estimated using Google Maps.
[2] The vehicle queue length was calculated assuming an average car length of 25 feet. A queue length of 5-25 feet is considered one vehicle, 26-50 feet is two vehicles, etc. The queuing results are also a product of a simulation that is designed to represent "real-life" drivers to the best extent possible. Therefore, each simulation run represents a unique set of data. An average of 10 runs is shown in the results table.
[3] This is the distance to Fairway Drive. Nugget Lane is marked “Keep Clear” and was therefore excluded. Analysis performed assuming the SR 299 corridor is the North-South direction.

Source: Fehr & Peers, 2011

The vehicle queues on SR 299 are not expected to spill back into adjacent intersections. Vehicle queues at the study intersections are only expected during the peak traffic periods and dissipate quickly.

Travel Time Through Corridor

Travel time through the SR 299 corridor was analyzed for 2009 conditions and 2040 conditions (with East Connector). **Table 12** shows the results and the technical analysis is provided in the **Attachment D**.

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TABLE 12
TRAVEL TIME THROUGH SR 299 CORRIDOR (WITH SIGNALS AND ROUNDABOUTS)

Direction of Travel	Travel Time	
	2009 Conditions (with East Connector)	2040 Conditions (with East Connector)
Northbound	4.2 minutes	4.3 minutes
Southbound	4.0 minutes	4.1 minutes

Notes: The analysis includes the section of SR 299 between the SR 299/Martin Street and SR 299/Garden Gulch Street-Forest Avenue intersections.
Source: Fehr & Peers, 2011

The total travel time through the corridor, with traffic signals and roundabouts at the study intersections, is approximately 4 minutes, which is an increase of ½ - 1 minute over the existing travel time.

Greenhouse Gas Emissions

Greenhouse gas emissions were analyzed using Synchro software. Carbon monoxide, nitrogen oxides, volatile organic compound emissions were analyzed at the study intersections. The emissions results are shown in **Table 13**. The technical analysis is provided in the **Attachment D**.

TABLE 13
GREENHOUSE GAS EMISSIONS RESULTS (WITH SIGNALS AND ROUNDABOUTS)

Intersection	Emissions[1]					
	2009 Conditions (with East Connector)			2040 Conditions (with East Connector)		
	CO	NO_X	VOC	CO	NO_X	VOC
SR 299/Glen Road-East Connector	1.03	0.20	0.24	1.15	0.22	0.27
SR 299/Washington Street	0.56	0.11	0.13	0.87	0.17	0.20
SR 299/SR 3	0.50	0.10	0.12	0.65	0.13	0.15
SR 299/Garden Gulch Street	0.60	0.12	0.14	0.71	0.14	0.17

Notes: [1] CO = Carbon Monoxide, NO_X = Nitrogen Oxides, VOC = Volatile Organic Compounds
Emissions reported in kilograms (for the peak hour).
Source: Fehr & Peers, 2011

The 2009 conditions (with East Connector) greenhouse gas emissions increase at some intersections and decrease at some intersections compared to existing conditions analysis results because the traffic volumes at the intersections change due to the East Connector. Therefore, the existing conditions and 2009 conditions (with East Connector) analysis results cannot be compared directly because the scenarios do not share a common baseline.

The 2040 conditions (with East Connector) with signalized intersections emissions results increase at all of the study intersections compared to the 2040 conditions with unsignalized intersections emissions results. The traffic volumes at the study intersections were the same for both scenarios. The traffic signals increased the emissions at the study intersections by small amounts (less than 0.20 kilograms). The emissions increase at the study intersections with roundabouts because a roundabout control reduces the speed of approaching vehicles causing vehicles to brake as they enter and accelerate as they exit a roundabout. Without a roundabout, the through movements on SR 299 are freely flowing and do not have to decelerate or accelerate at intersections.

SUMMARY OF CORRIDOR ANALYSIS RESULTS

Table 14 shows a summary of the level of service results at the study intersections assuming different traffic controls.

Table 15 shows the travel time results through the SR 299 corridor for the three analysis scenarios: unsignalized intersections (existing conditions), signalized intersections (2009 conditions with the East Connector and 2040 conditions with the East Connector), and signalized and roundabout intersections (2009 conditions with the East Connector and 2040 conditions with the East Connector).

Table 16 shows the greenhouse gas emissions analysis results. The existing conditions analysis results, along with the 2009 conditions (with East Connector) and 2040 conditions (with East Connector) analysis results with signalized and roundabout controls are shown.

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TABLE 14
LEVEL OF SERVICE SUMMARY TABLE

Intersection	Control Type[1]	Existing Conditions		2009 Conditions (with East Connector)		2040 Conditions (with East Connector)	
		Delay[2]	LOS	Delay[2]	LOS	Delay[2]	LOS
SR 299/Glen Road-East Connector	SSSC	24.7	C	**42.8**	**E**	**80.3**	**F**
	Signal	--	--	13.7	B	13.9	B
	Roundabout			9.1	A	9.5	A
SR 299/Washington Street	SSSC	**44.0**	**E**	27.8	D	**128.1**	**F**
	Signal	--	--	10.3	B	11.9	B
SR 299/SR 3	SSSC	16.7	C	17.2	C	15.7	C
	Signal	--	--	10.4	B	11.6	B
SR 299/Garden Gulch Street	SSSC	20.9	C	22.9	C	29.7	D
	Signal	--	--	11.8	B	15.3	B
	Roundabout			7.6	A	7.9	A

Notes: [1] SSSC = Side Street Stop Control
[2] Delay is reported in seconds per vehicle for the overall intersection for signalized and roundabout intersections, and the worst movement for unsignalized intersections.

Source: Fehr & Peers, 2011

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TABLE 15
TRAVEL TIME SUMMARY TABLE

Direction of Travel	Existing Conditions	2009 Conditions (with East Connector)[1]		2040 Conditions (with East Connector)[1]	
	Unsignalized Intersections	Signalized Intersections	Signalized and Roundabout Intersections	Signalized Intersections	Signalized and Roundabout Intersections
Northbound	2.9 minutes	4.2 minutes	4.2 minutes	4.3 minutes	4.3 minutes
Southbound	3.4 minutes	3.8 minutes	4.0 minutes	3.9 minutes	4.1 minutes

Notes: [1] Signals or roundabouts will be added with the East Connector which will increase the travel time through the SR 299 corridor.
The analysis includes the section of SR 299 between the SR 299/Martin Street and SR 299/Garden Gulch Street – Forest Avenue intersections.

Source: Fehr & Peers, 2011

Adding signals or roundabouts to the study intersections increases the travel time through the SR 299 corridor by approximately ½ minute to 1 ½ minutes depending on the direction of travel. The difference in travel time between 2009 conditions and 2040 conditions is 0.1 minutes.

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TABLE 16
GREENHOUSE GAS EMISSIONS SUMMARY TABLE

Intersection	Existing Conditions			2009 Conditions (with East Connector)						2040 Conditions (with East Connector)								
	Unsignalized Intersections			Signalized Intersections			Signalized and Roundabout Intersections			Unsignalized Intersections			Signalized Intersections			Signalized and Roundabout Intersections		
	CO	NO_X	VOC	CO	NO_X	VOC	CO	NO_X	VOC	CO	NO_X	VOC	CO	NO_X	VOC	CO	NO_X	VOC
SR 299/Glen Road-East Connector	1.02	0.20	0.24	1.01	0.20	0.23	1.03	0.20	0.24	1.13	0.22	0.26	1.14	0.22	0.27	1.15	0.22	0.27
SR 299/ Washington Street	1.40	0.27	0.33	0.56	0.11	0.13	0.56	0.11	0.13	0.74	0.14	0.17	0.88	0.17	0.20	0.87	0.17	0.20
SR 299/SR 3	0.80	0.16	0.19	0.50	0.10	0.12	0.50	0.10	0.12	0.50	0.10	0.12	0.65	0.13	0.15	0.65	0.13	0.15
SR 299/Garden Gulch Street	0.52	0.10	0.12	0.58	0.11	0.13	0.60	0.12	0.14	0.58	0.11	0.13	0.70	0.14	0.16	0.71	0.14	0.17

Notes: [1] CO = Carbon Monoxide, NO_X = Nitrogen Oxides, VOC = Volatile Organic Compounds
Source: Fehr & Peers, 2011

The analysis results show that signals and roundabout will increase emissions at the study intersections, but by a very small amount. Traffic congestion along SR 299 through Weaverville is minimal; therefore there is little difference in emissions at a traffic signal versus a roundabout.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

CENTER STREET CONVERSION ANALYSIS

Analysis was performed to determine the effects of converting Center Street between Court Street and SR 3 from a one-way section to a two-way section. Traffic operations at the SR 299/SR 3 intersection were analyzed. The Trinity County travel demand model and daily roadway segment traffic volumes provided by the County were used to determine initial traffic volume estimates on Center Street, and SR 3, SR 299, and Court Street adjacent to Center Street.

Traffic volumes on Center Street and the surrounding roadway network were adjusted assuming Center Street is converted from a one-way section to a two-way section. **Table 17** shows the change in delay and level of service at the SR 299/SR 3 intersection based on a shift in traffic to Center Street. The technical calculations are provided in **Attachment F**.

TABLE 17
CENTER STREET CONVERSION LOS RESULTS – SR 299/SR 3

Scenario	Without Conversion (One-Way Section)		With Conversion (Two-Way Section)	
	Delay[1]	LOS	Delay[1]	LOS
Existing Conditions	16.7	C	16.6	C
2009 (with East Connector)	17.2	C	14.4	C
2040 (with East Connector)	15.7	C	15.7	C

Notes: [1] Delay is reported in seconds per vehicle for worst movement for unsignalized intersections.
Source: Fehr & Peers, 2011

As shown in the table, the delay at the SR 299/SR 3 intersection is expected to decrease or stay the same if Center Street is converted to a two-way section.

The daily roadway segment traffic volumes were analyzed based on a shift in traffic to Center Street. Center Street currently carries 700-800 daily trips and is a one way street. Converting Center Street to two-way operations will shift approximately 500-600 daily trips from State Route 299 (between SR 3 and Court Street in Downtown Weaverville) to Center Street. The study segment of Center Street is expected to carry 1,200 – 1,300 daily trips, and operate at LOS B as a two-way section. The daily LOS on SR 299 between SR 3 and Court Street in Downtown Weaverville would remain at the current level.

CONCLUSIONS AND RECOMMENDATIONS

Scenario 1: Unsignalized Intersections

- The SR 299/Washington Street intersection currently operates at an unacceptable level of service.
- When the East Connector is constructed, traffic is expected to shift from Washington Street to the East Connector, improving the level of service at the SR 299/Washington

Street intersection, but diminishing the level of service at the SR 299/Glen Road-East Connector intersection under 2009 conditions (with East Connector).

- The SR 299/Glen Road-East Connector and SR 299/Washington Street intersections will operate at unacceptable levels of service under 2040 conditions (with East Connector) with unsignalized intersections.

- The travel time through the SR 299 corridor is approximately 3 to 3 ½ minutes with unsignalized intersections.

Scenario 2: Signalized Intersections

- The study intersections are expected to operate at LOS B with traffic signals.

- Queue lengths are not expected to exceed storage lengths or spill back into upstream intersections.

- The travel time through the corridor is expected to increase by ½ - 1 ½ minute compared to existing conditions.

- The 2040 conditions greenhouse gas emissions analysis compared the results of the unsignalized intersections to the signalized intersections. The results show that signalized intersections will increase emissions along SR 299, but by a small amount (less than 0.20 kilograms).

- The Traffic Vibration Assessment (provided in **Attachment E**) indicates that installing traffic signals at the study intersections will not significantly increase roadway vibration along the SR 299 corridor.

Scenario 3: Signalized and Roundabout Intersections

- The study intersections are expected to operate at LOS B or better with traffic signals and roundabouts. (Roundabouts at the SR 299/Glen Road-East Connector and SR 299/Garden Gulch Street intersections.)

- Queue lengths are not expected to exceed storage lengths or spill back into upstream intersections.

- The travel time through the corridor is expected to increase by ½ - 1 ½ minute compared to existing conditions.

- The 2040 conditions greenhouse gas emissions analysis compares the results of the unsignalized intersections to the signalized and roundabout intersections. The results show that signalized and roundabout intersections will increase emissions along SR 299, but by a small amount (less than 0.20 kilograms). The comparison of signals to roundabouts at the study intersections is negligible. The production of emissions at the study intersections is virtually the same with a roundabout or a signal.

Overall, the analysis indicates that a system of traffic signals or a combination of traffic signals and roundabouts will function well.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Center Street Conversion

- The daily LOS on SR 299 between SR 3 and Court Street in Downtown Weaverville would remain at the current level.
- The delay at the SR 299/SR 3 intersection is expected to decrease or stay the same if Center Street is converted from a one-way section to a two-way section (under existing and 2040 conditions).
- The Center Street roadway segment between Court Street and SR 3 is expected to operate at LOS B as a two-way section (it currently operates at LOS B as a one-way segment).

Based on the analysis, we recommend:

- A traffic signal or roundabout should be installed at the SR 299/Glen Road-East Connector intersection when the East Connector roadway is constructed.
- A traffic signal should be installed at the SR 299/Washington Street intersection when traffic volumes and level of service indicate the need (anticipated in the 10-20 year timeframe).
- A traffic signal or roundabout should be constructed at the SR 299/Garden Gulch intersection when traffic volumes and level of service indicate the need (anticipated in 10-20 year timeframe).

We appreciate the opportunity to assist Trinity County with this project. Please feel free to call if you have any questions (775) 826-3200.

Sincerely,

FEHR & PEERS

Katy Cole, P.E.
Associate

Marissa Harned
Transportation Planner

RN09-0427

Attachments

A – Signal Warrant Analysis
B – Scenario 1: Unsignalized Intersections
C – Scenario 2: Signalized Intersections
D – Scenario 3: Signalized and Roundabout Intersections

E – Traffic Vibration Assessment: Trinity County Intersection Improvements (Bollard Acoustical Consultants, Inc.)
F – Center Street Conversion Analysis

ATTACHMENT A
SIGNAL WARRANT ANALYSIS

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: East Connector
Scenario: 2009 Conditions (with East Connector)
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	366	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	340	Minor Street (Higher Volume App.):	136
Major Street Total (Both Approaches):	706	Minor Street Total:	136
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	80

FOUR HOUR VOLUME WARRANT SATISFIED? **YES**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	430	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	400	Minor Street (Higher Volume App.):	160
Major Street Total (Both Approaches):	830	Minor Street Total:	160
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	110

PEAK HOUR VOLUME WARRANT SATISFIED? **YES**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: Washington
Scenario: Existing
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	404	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	329	Minor Street (Higher Volume App.):	82
Major Street Total (Both Approaches):	733	Minor Street Total:	82
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	70

FOUR HOUR VOLUME WARRANT SATISFIED? **YES**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	475	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	387	Minor Street (Higher Volume App.):	97
Major Street Total (Both Approaches):	862	Minor Street Total:	97
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	100

PEAK HOUR VOLUME WARRANT SATISFIED? **NO**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street:	SR 299	
Minor Street:	SR 3	
Scenario:	Existing	
Urban/Rural:	r	(U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	258	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	229	Minor Street (Higher Volume App.):	124
Major Street Total (Both Approaches):	487	Minor Street Total:	124
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	130

FOUR HOUR VOLUME WARRANT SATISFIED? **NO**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	304	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	269	Minor Street (Higher Volume App.):	146
Major Street Total (Both Approaches):	573	Minor Street Total:	146
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	180

PEAK HOUR VOLUME WARRANT SATISFIED? **NO**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: Garden Gultch
Scenario: Existing
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	258	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	196	Minor Street (Higher Volume App.):	52
Major Street Total (Both Approaches):	454	Minor Street Total:	52
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	140

FOUR HOUR VOLUME WARRANT SATISFIED? **NO**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	304	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	231	Minor Street (Higher Volume App.):	61
Major Street Total (Both Approaches):	535	Minor Street Total:	61
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	200

PEAK HOUR VOLUME WARRANT SATISFIED? **NO**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: East Connector
Scenario: 2040
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	417	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	374	Minor Street (Higher Volume App.):	136
Major Street Total (Both Approaches):	791	Minor Street Total:	136
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	60

FOUR HOUR VOLUME WARRANT SATISFIED? **YES**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	490	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	440	Minor Street (Higher Volume App.):	160
Major Street Total (Both Approaches):	930	Minor Street Total:	160
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	90

PEAK HOUR VOLUME WARRANT SATISFIED? **YES**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: Washington
Scenario: 2040
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	459	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	391	Minor Street (Higher Volume App.):	136
Major Street Total (Both Approaches):	850	Minor Street Total:	136
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	60

FOUR HOUR VOLUME WARRANT SATISFIED? **YES**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	540	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	460	Minor Street (Higher Volume App.):	160
Major Street Total (Both Approaches):	1,000	Minor Street Total:	160
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	80

PEAK HOUR VOLUME WARRANT SATISFIED? **YES**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: SR 3
Scenario: 2040
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	298	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	289	Minor Street (Higher Volume App.):	162
Major Street Total (Both Approaches):	587	Minor Street Total:	162
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	100

FOUR HOUR VOLUME WARRANT SATISFIED? **YES**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	350	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	340	Minor Street (Higher Volume App.):	190
Major Street Total (Both Approaches):	690	Minor Street Total:	190
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	150

PEAK HOUR VOLUME WARRANT SATISFIED? **YES**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

TRAFFIC SIGNAL WARRANTS
FOUR HOUR VEHICULAR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)
PEAK HOUR VEHICULAR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Major Street: SR 299
Minor Street: Garden Gultch
Scenario: 2040
Urban/Rural: r (U=urban, R=rural [a])

FOUR HOUR VOLUME (MUTCD Warrant 2, Caltrans Warrant 9)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	323	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	247	Minor Street (Higher Volume App.):	77
Major Street Total (Both Approaches):	570	Minor Street Total:	77
Minimum Volume on Major Street to Satisfy Warrant (see note [c]):	270	Minimum Volume on Minor Street to Satisfy Warrant (see note [c]):	110

FOUR HOUR VOLUME WARRANT SATISFIED? **NO**

PEAK HOUR VOLUME (MUTCD Warrant 3, Caltrans Warrant 11)

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		
Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	380	Major Street Left Turn (see note [b]):	0
Major Street (Approach 2):	290	Minor Street (Higher Volume App.):	90
Major Street Total (Both Approaches):	670	Minor Street Total:	90
Minimum Volume on Major Street to Satisfy Warrant (see note [d]):	310	Minimum Volume on Minor Street to Satisfy Warrant (see note [d]):	150

PEAK HOUR VOLUME WARRANT SATISFIED? **NO**

Notes:

a. May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

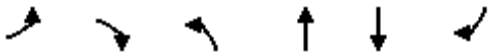
b. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.

c. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-2.

d. From: USDOT, FHWA, "Manual on Uniform Traffic Control Devices," 2001, Figure 4C-4.

Adopted from: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices, Millennium Edition," 2001; and Caltrans, "Traffic Manual," 2002.

ATTACHMENT B
SCENARIO 1: UNSIGNALIZED INTERSECTIONS



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	112	29	34	378	352	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	122	32	37	411	383	77
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	906	421	460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	906	421	460			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	95	97			
cM capacity (veh/h)	296	632	1101			

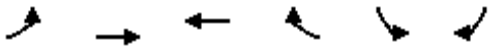
Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	153	37	411	460
Volume Left	122	37	0	0
Volume Right	32	0	0	77
cSH	333	1101	1700	1700
Volume to Capacity	0.46	0.03	0.24	0.27
Queue Length 95th (ft)	58	3	0	0
Control Delay (s)	24.7	8.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	24.7	0.7		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	22	355	10	39	331	105	9	4	31	84	3	10
Peak Hour Factor	0.90	0.90	0.90	0.87	0.87	0.87	0.73	0.73	0.73	0.70	0.70	0.70
Hourly flow rate (vph)	24	394	11	45	380	121	12	5	42	120	4	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	501			406			935	1040	400	959	925	380
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	501			406			935	1040	400	959	925	380
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			96			95	97	93	42	98	98
cM capacity (veh/h)	1063			1153			226	216	650	207	253	667

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	24	406	45	380	121	60	139
Volume Left	24	0	45	0	0	12	120
Volume Right	0	11	0	0	121	42	14
cSH	1063	1700	1153	1700	1700	415	224
Volume to Capacity	0.02	0.24	0.04	0.22	0.07	0.15	0.62
Queue Length 95th (ft)	2	0	3	0	0	13	91
Control Delay (s)	8.5	0.0	8.2	0.0	0.0	15.1	44.0
Lane LOS	A		A			C	E
Approach Delay (s)	0.5		0.7			15.1	44.0
Approach LOS						C	E

Intersection Summary				
Average Delay	6.5			
Intersection Capacity Utilization	44.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		-6%	6%		0%	
Volume (veh/h)	68	201	219	85	68	78
Peak Hour Factor	0.86	0.86	0.87	0.87	0.91	0.91
Hourly flow rate (vph)	79	234	252	98	75	86
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	349				692	301
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349				692	301
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				80	88
cM capacity (veh/h)	1209				383	739

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	79	234	349	75	86
Volume Left	79	0	0	75	0
Volume Right	0	0	98	0	86
cSH	1209	1700	1700	383	739
Volume to Capacity	0.07	0.14	0.21	0.20	0.12
Queue Length 95th (ft)	5	0	0	18	10
Control Delay (s)	8.2	0.0	0.0	16.7	10.5
Lane LOS	A			C	B
Approach Delay (s)	2.1		0.0	13.4	
Approach LOS				B	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		4%			0%			5%			-5%	
Volume (veh/h)	5	222	4	79	186	39	9	4	48	38	5	7
Peak Hour Factor	0.83	0.84	0.83	0.84	0.84	0.84	0.90	0.90	0.90	0.74	0.74	0.74
Hourly flow rate (vph)	6	264	5	94	221	46	10	4	53	51	7	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								1				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	268			269			701	735	267	765	714	245
vC1, stage 1 conf vol							279	279				
vC2, stage 2 conf vol							422	456				
vCu, unblocked vol	268			269			701	735	267	765	714	245
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5				
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			98	99	93	82	98	99
cM capacity (veh/h)	1296			1294			423	409	772	279	330	794

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	6	269	94	268	14	53	58	9
Volume Left	6	0	94	0	10	0	51	0
Volume Right	0	5	0	46	0	53	0	9
cSH	1296	1700	1294	1700	419	772	284	794
Volume to Capacity	0.00	0.16	0.07	0.16	0.03	0.07	0.20	0.01
Queue Length 95th (ft)	0	0	6	0	3	6	19	1
Control Delay (s)	7.8	0.0	8.0	0.0	13.9	10.0	20.9	9.6
Lane LOS	A		A		B	B	C	A
Approach Delay (s)	0.2		2.1		10.8		19.3	
Approach LOS					B		C	

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	35.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	100	30	30	60	20	10	40	320	70	20	310	70
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	118	35	35	71	24	12	47	376	82	24	365	82
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	900	965	365	918	965	376	447			459		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	900	965	365	918	965	376	447			459		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	48	85	95	65	90	98	96			98		
cM capacity (veh/h)	225	239	680	202	239	670	1113			1102		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	188	106	47	376	82	24	365	82
Volume Left	118	71	47	0	0	24	0	0
Volume Right	35	12	0	0	82	0	0	82
cSH	274	238	1113	1700	1700	1102	1700	1700
Volume to Capacity	0.69	0.45	0.04	0.22	0.05	0.02	0.21	0.05
Queue Length 95th (ft)	115	53	3	0	0	2	0	0
Control Delay (s)	42.8	32.3	8.4	0.0	0.0	8.3	0.0	0.0
Lane LOS	E	D	A			A		
Approach Delay (s)	42.8	32.3	0.8			0.4		
Approach LOS	E	D						

Intersection Summary				
Average Delay	9.5			
Intersection Capacity Utilization	44.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	40	30	10	10	40	330	20	30	360	10
Peak Hour Factor	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Hourly flow rate (vph)	14	14	55	43	14	14	46	379	23	33	400	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	965	966	406	1000	949	379	411			402		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	965	966	406	1000	949	379	411			402		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	94	92	77	94	98	96			97		
cM capacity (veh/h)	208	237	645	184	243	668	1148			1156		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	82	71	46	379	23	33	411
Volume Left	14	43	46	0	0	33	0
Volume Right	55	14	0	0	23	0	11
cSH	394	228	1148	1700	1700	1156	1700
Volume to Capacity	0.21	0.31	0.04	0.22	0.01	0.03	0.24
Queue Length 95th (ft)	19	32	3	0	0	2	0
Control Delay (s)	16.5	27.8	8.3	0.0	0.0	8.2	0.0
Lane LOS	C	D	A			A	
Approach Delay (s)	16.5	27.8	0.8			0.6	
Approach LOS	C	D					

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		6%			-6%
Volume (veh/h)	70	80	220	90	70	210
Peak Hour Factor	0.91	0.91	0.87	0.87	0.86	0.86
Hourly flow rate (vph)	77	88	253	103	81	244
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	712	305			356	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	712	305			356	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	88			93	
cM capacity (veh/h)	372	735			1202	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	77	88	356	81	244
Volume Left	77	0	0	81	0
Volume Right	0	88	103	0	0
cSH	372	735	1700	1202	1700
Volume to Capacity	0.21	0.12	0.21	0.07	0.14
Queue Length 95th (ft)	19	10	0	5	0
Control Delay (s)	17.2	10.6	0.0	8.2	0.0
Lane LOS	C	B		A	
Approach Delay (s)	13.6		0.0	2.1	
Approach LOS	B				

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		5%			-5%			0%			4%	
Volume (veh/h)	10	10	50	40	10	10	80	190	40	10	230	10
Peak Hour Factor	0.90	0.90	0.90	0.74	0.74	0.74	0.84	0.84	0.84	0.83	0.84	0.83
Hourly flow rate (vph)	11	11	56	54	14	14	95	226	48	12	274	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh)		1										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	741	768	280	799	750	250	286			274		
vC1, stage 1 conf vol	304	304										
vC2, stage 2 conf vol	437	464										
vCu, unblocked vol	741	768	280	799	750	250	286			274		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5										
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	97	93	79	96	98	93			99		
cM capacity (veh/h)	397	395	759	258	312	789	1276			1289		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	22	56	68	14	95	274	12	286
Volume Left	11	0	54	0	95	0	12	0
Volume Right	0	56	0	14	0	48	0	12
cSH	396	759	267	789	1276	1700	1289	1700
Volume to Capacity	0.06	0.07	0.25	0.02	0.07	0.16	0.01	0.17
Queue Length 95th (ft)	4	6	24	1	6	0	1	0
Control Delay (s)	14.6	10.1	22.9	9.6	8.0	0.0	7.8	0.0
Lane LOS	B	B	C	A	A		A	
Approach Delay (s)	11.4		20.7		2.1		0.3	
Approach LOS	B		C					

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	36.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	100	30	30	80	20	20	40	360	90	30	350	60
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	118	35	35	94	24	24	47	424	106	35	412	71
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1024	1106	412	1035	1071	424	482			529		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1024	1106	412	1035	1071	424	482			529		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	34	82	94	42	88	96	96			97		
cM capacity (veh/h)	177	194	640	161	204	630	1080			1038		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	188	141	47	424	106	35	412	71
Volume Left	118	94	47	0	0	35	0	0
Volume Right	35	24	0	0	106	0	0	71
cSH	214	200	1080	1700	1700	1038	1700	1700
Volume to Capacity	0.88	0.71	0.04	0.25	0.06	0.03	0.24	0.04
Queue Length 95th (ft)	173	112	3	0	0	3	0	0
Control Delay (s)	80.3	57.6	8.5	0.0	0.0	8.6	0.0	0.0
Lane LOS	F	F	A			A		
Approach Delay (s)	80.3	57.6	0.7			0.6		
Approach LOS	F	F						

Intersection Summary				
Average Delay	16.8			
Intersection Capacity Utilization	46.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	40	90	10	10	50	380	110	30	410	20
Peak Hour Factor	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Hourly flow rate (vph)	14	14	55	129	14	14	57	437	126	33	456	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1106	1211	467	1136	1096	437	478			563		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1106	1211	467	1136	1096	437	478			563		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	92	91	10	93	98	95			97		
cM capacity (veh/h)	162	167	596	143	195	620	1084			1008		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	82	157	57	437	126	33	478
Volume Left	14	129	57	0	0	33	0
Volume Right	55	14	0	0	126	0	22
cSH	318	158	1084	1700	1700	1008	1700
Volume to Capacity	0.26	1.00	0.05	0.26	0.07	0.03	0.28
Queue Length 95th (ft)	25	191	4	0	0	3	0
Control Delay (s)	20.2	128.1	8.5	0.0	0.0	8.7	0.0
Lane LOS	C	F	A			A	
Approach Delay (s)	20.2	128.1	0.8			0.6	
Approach LOS	C	F					

Intersection Summary				
Average Delay	16.5			
Intersection Capacity Utilization	48.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		6%			-6%
Volume (veh/h)	80	110	260	90	90	250
Peak Hour Factor	0.91	0.91	0.87	0.87	0.86	0.86
Hourly flow rate (vph)	88	121	299	103	105	291
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		7				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	851	351			402	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	851	351			402	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	83			91	
cM capacity (veh/h)	301	693			1156	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	209	402	105	291
Volume Left	88	0	105	0
Volume Right	121	103	0	0
cSH	714	1700	1156	1700
Volume to Capacity	0.29	0.24	0.09	0.17
Queue Length 95th (ft)	30	0	7	0
Control Delay (s)	15.7	0.0	8.4	0.0
Lane LOS	C		A	
Approach Delay (s)	15.7	0.0	2.2	
Approach LOS	C			

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		5%			-5%			0%			4%	
Volume (veh/h)	20	10	60	50	10	10	90	240	50	10	270	10
Peak Hour Factor	0.90	0.90	0.90	0.74	0.74	0.74	0.84	0.84	0.84	0.83	0.84	0.83
Hourly flow rate (vph)	22	11	67	68	14	14	107	286	60	12	321	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type		TWLTL			None							
Median storage veh)		1										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	865	911	327	948	887	315	333			345		
vC1, stage 1 conf vol	352	352										
vC2, stage 2 conf vol	514	560										
vCu, unblocked vol	865	911	327	948	887	315	333			345		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5										
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	97	91	66	95	98	91			99		
cM capacity (veh/h)	345	347	714	198	256	725	1226			1214		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	33	67	95	107	345	12	333
Volume Left	22	0	68	107	0	12	0
Volume Right	0	67	14	0	60	0	12
cSH	346	714	242	1226	1700	1214	1700
Volume to Capacity	0.10	0.09	0.39	0.09	0.20	0.01	0.20
Queue Length 95th (ft)	8	8	44	7	0	1	0
Control Delay (s)	16.5	10.6	29.7	8.2	0.0	8.0	0.0
Lane LOS	C	B	D	A		A	
Approach Delay (s)	12.5		29.7	1.9		0.3	
Approach LOS	B		D				

Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	39.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Lane	0.8	13.2	0.1	29
	1.4	27.2	0.2	28
	2.5	31.8	0.2	27
Washington Street	3.2	27.7	0.2	32
	2.2	26.0	0.2	26
SR 3	3.9	29.2	0.2	29
	1.4	14.1	0.1	25
Garden Gulch	1.0	6.7	0.0	26
Total	16.5	176.0	1.4	28

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	2.1	43.8	0.3	29
	0.5	6.6	0.0	27
SR 3	0.8	11.8	0.1	30
	1.9	30.3	0.2	27
	2.3	22.1	0.2	32
	3.3	33.0	0.2	26
	4.1	33.5	0.2	26
Martin Lane	2.9	24.0	0.2	31
Total	17.7	205.1	1.6	28

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	1.2	18.9	0.1	29
	1.3	21.1	0.2	28
East Connector Road	1.1	7.4	0.1	30
	2.4	31.8	0.2	27
Washington Street	3.2	30.5	0.2	28
	2.9	27.0	0.2	25
SR 3	4.4	30.3	0.2	27
	1.5	13.9	0.1	25
Garden Gulch	1.1	6.9	0.0	26
Total	19.2	187.9	1.4	27

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	2.5	44.6	0.3	28
	0.5	6.5	0.0	27
SR 3	0.9	11.9	0.1	30
	2.0	30.4	0.2	27
	2.4	22.5	0.2	31
	3.3	32.0	0.2	26
Glen Road	4.3	31.6	0.2	27
	0.9	8.2	0.1	26
Nugget Lane	1.6	19.2	0.2	30
Total	18.3	207.1	1.6	28

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	1.3	17.4	0.1	29
	1.0	15.7	0.1	27
East Connector Road	1.4	8.3	0.1	31
	4.1	44.8	0.3	26
Washington Street	3.0	21.5	0.2	27
	2.6	26.6	0.2	26
SR 3	4.2	29.9	0.2	28
	1.6	14.0	0.1	25
Garden Gulch	1.2	7.0	0.0	25
Total	20.4	185.3	1.4	27

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	2.7	44.9	0.3	28
	0.5	6.6	0.0	27
SR 3	1.0	12.1	0.1	29
	2.1	30.6	0.2	27
	2.7	23.0	0.2	30
	2.4	22.2	0.2	26
Glen Road	5.1	40.8	0.3	29
	1.1	9.4	0.1	26
Nugget Lane	1.4	14.8	0.1	29
Total	19.0	204.4	1.6	28

1: Glen Road & SR 299

Direction	All
Volume (vph)	977
CO Emissions (kg)	1.02
NOx Emissions (kg)	0.20
VOC Emissions (kg)	0.24

2: Washington Street & SR 299

Direction	All
Volume (vph)	1001
CO Emissions (kg)	1.40
NOx Emissions (kg)	0.27
VOC Emissions (kg)	0.33

3: SR 3 & SR 299

Direction	All
Volume (vph)	719
CO Emissions (kg)	0.80
NOx Emissions (kg)	0.16
VOC Emissions (kg)	0.19

4: Forest Ave & SR 299

Direction	All
Volume (vph)	645
CO Emissions (kg)	0.52
NOx Emissions (kg)	0.10
VOC Emissions (kg)	0.12

1: Glen Road & SR 299

Direction	All
Volume (vph)	1210
CO Emissions (kg)	1.13
NOx Emissions (kg)	0.22
VOC Emissions (kg)	0.26

2: Washington Street & SR 299

Direction	All
Volume (vph)	1171
CO Emissions (kg)	0.74
NOx Emissions (kg)	0.14
VOC Emissions (kg)	0.17

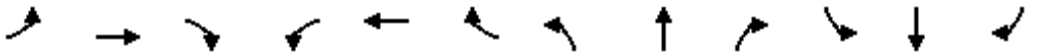
3: SR 3 & SR 299

Direction	All
Volume (vph)	880
CO Emissions (kg)	0.50
NOx Emissions (kg)	0.10
VOC Emissions (kg)	0.12

4: Forest Ave & SR 299

Direction	All
Volume (vph)	832
CO Emissions (kg)	0.58
NOx Emissions (kg)	0.11
VOC Emissions (kg)	0.13

ATTACHMENT C
SCENARIO 2: SIGNALIZED INTERSECTIONS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1794	1583		1796	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.71	1.00		0.67	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1328	1583		1251	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	100	30	30	60	20	10	40	320	70	20	310	70
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	118	35	35	71	24	12	47	376	82	24	365	82
RTOR Reduction (vph)	0	0	29	0	0	10	0	0	29	0	0	32
Lane Group Flow (vph)	0	153	6	0	95	2	47	376	53	24	365	50
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		9.3	9.3		9.3	9.3	1.8	31.6	31.6	1.3	31.1	31.1
Effective Green, g (s)		9.3	9.3		9.3	9.3	1.8	31.6	31.6	1.3	31.1	31.1
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.03	0.58	0.58	0.02	0.57	0.57
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		228	272		215	272	59	1086	923	42	1069	908
v/s Ratio Prot							c0.03	c0.20		0.01	0.20	
v/s Ratio Perm		c0.12	0.00		0.08	0.00			0.03			0.03
v/c Ratio		0.67	0.02		0.44	0.01	0.80	0.35	0.06	0.57	0.34	0.05
Uniform Delay, d1		21.0	18.7		20.1	18.6	26.0	5.9	4.9	26.2	6.1	5.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		7.5	0.0		1.4	0.0	51.1	0.2	0.0	17.4	0.2	0.0
Delay (s)		28.6	18.7		21.6	18.6	77.1	6.1	4.9	43.6	6.3	5.1
Level of Service		C	B		C	B	E	A	A	D	A	A
Approach Delay (s)		26.7			21.2			12.5			8.0	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1682			1760		1770	1863	1583	1770	1855	
Flt Permitted		0.96			0.90		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1629			1635		1770	1863	1583	1770	1855	
Volume (vph)	10	10	40	30	10	10	40	330	20	30	360	10
Peak-hour factor, PHF	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	14	14	55	43	14	14	46	379	23	33	400	11
RTOR Reduction (vph)	0	51	0	0	13	0	0	0	7	0	1	0
Lane Group Flow (vph)	0	32	0	0	58	0	46	379	16	33	410	0
Turn Type	Perm			Perm			Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		4.1			4.1		3.6	40.2	40.2	1.6	38.2	
Effective Green, g (s)		4.1			4.1		3.6	40.2	40.2	1.6	38.2	
Actuated g/C Ratio		0.07			0.07		0.06	0.69	0.69	0.03	0.66	
Clearance Time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		115			116		110	1293	1099	49	1224	
v/s Ratio Prot							c0.03	0.20		0.02	c0.22	
v/s Ratio Perm		0.02			c0.04				0.01			
v/c Ratio		0.28			0.50		0.42	0.29	0.01	0.67	0.34	
Uniform Delay, d1		25.5			25.9		26.1	3.4	2.7	27.9	4.3	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.3			3.4		2.6	0.1	0.0	30.8	0.2	
Delay (s)		26.8			29.3		28.7	3.5	2.7	58.7	4.5	
Level of Service		C			C		C	A	A	E	A	
Approach Delay (s)		26.8			29.3			6.1			8.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		6%			-6%
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1736		1823	1919
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1736		1823	1919
Volume (vph)	70	80	220	90	70	210
Peak-hour factor, PHF	0.91	0.91	0.87	0.87	0.86	0.86
Adj. Flow (vph)	77	88	253	103	81	244
RTOR Reduction (vph)	0	77	19	0	0	0
Lane Group Flow (vph)	77	11	337	0	81	244
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	6.6	6.6	30.9		4.1	39.0
Effective Green, g (s)	6.6	6.6	30.9		4.1	39.0
Actuated g/C Ratio	0.12	0.12	0.58		0.08	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	218	195	1001		139	1396
v/s Ratio Prot	c0.04		c0.19		c0.04	0.13
v/s Ratio Perm		0.01				
v/c Ratio	0.35	0.06	0.34		0.58	0.17
Uniform Delay, d1	21.5	20.7	6.0		23.9	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	0.1	0.2		6.1	0.1
Delay (s)	22.5	20.9	6.2		30.0	2.3
Level of Service	C	C	A		C	A
Approach Delay (s)	21.6		6.2			9.2
Approach LOS	C		A			A

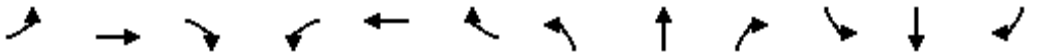
Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			-5%			0%			4%	
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1772	1544		1836	1623	1770	1814		1734	1814	
Flt Permitted		0.84	1.00		0.76	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1519	1544		1442	1623	1770	1814		1734	1814	
Volume (vph)	10	10	50	40	10	10	80	190	40	10	230	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.74	0.74	0.74	0.84	0.84	0.84	0.83	0.84	0.83
Adj. Flow (vph)	11	11	56	54	14	14	95	226	48	12	274	12
RTOR Reduction (vph)	0	0	49	0	0	12	0	8	0	0	2	0
Lane Group Flow (vph)	0	22	7	0	68	2	95	266	0	12	284	0
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		6.7	6.7		6.7	6.7	5.7	37.6		1.0	32.9	
Effective Green, g (s)		6.7	6.7		6.7	6.7	5.7	37.6		1.0	32.9	
Actuated g/C Ratio		0.12	0.12		0.12	0.12	0.10	0.66		0.02	0.57	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		178	181		169	190	176	1190		30	1042	
v/s Ratio Prot							c0.05	0.15		0.01	c0.16	
v/s Ratio Perm		0.01	0.00		c0.05	0.00						
v/c Ratio		0.12	0.04		0.40	0.01	0.54	0.22		0.40	0.27	
Uniform Delay, d1		22.7	22.4		23.4	22.4	24.6	4.0		27.9	6.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.1		1.6	0.0	3.2	0.1		8.5	0.1	
Delay (s)		23.0	22.5		25.0	22.4	27.7	4.1		36.4	6.3	
Level of Service		C	C		C	C	C	A		D	A	
Approach Delay (s)		22.6			24.6			10.2			7.5	
Approach LOS		C			C			B			A	

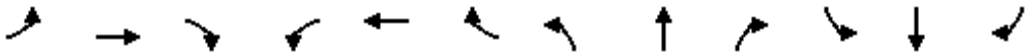
Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1794	1583		1791	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.70	1.00		0.66	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1302	1583		1231	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	100	30	30	80	20	20	40	360	90	30	350	60
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	118	35	35	94	24	24	47	424	106	35	412	71
RTOR Reduction (vph)	0	0	29	0	0	20	0	0	36	0	0	25
Lane Group Flow (vph)	0	153	6	0	118	4	47	424	70	35	412	46
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		9.3	9.3		9.3	9.3	1.8	30.7	30.7	1.8	30.7	30.7
Effective Green, g (s)		9.3	9.3		9.3	9.3	1.8	30.7	30.7	1.8	30.7	30.7
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.03	0.57	0.57	0.03	0.57	0.57
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		225	274		213	274	59	1063	903	59	1063	903
v/s Ratio Prot							c0.03	c0.23		0.02	0.22	
v/s Ratio Perm		c0.12	0.00		0.10	0.00			0.04			0.03
v/c Ratio		0.68	0.02		0.55	0.02	0.80	0.40	0.08	0.59	0.39	0.05
Uniform Delay, d1		20.9	18.5		20.4	18.5	25.8	6.4	5.2	25.6	6.4	5.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		8.2	0.0		3.1	0.0	51.1	0.2	0.0	15.0	0.2	0.0
Delay (s)		29.0	18.5		23.5	18.5	76.9	6.7	5.2	40.6	6.6	5.1
Level of Service		C	B		C	B	E	A	A	D	A	A
Approach Delay (s)		27.1			22.6			12.1			8.7	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



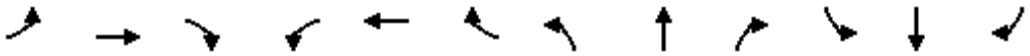
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1682			1768		1770	1863	1583	1770	1850	
Flt Permitted		0.94			0.78		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1596			1442		1770	1863	1583	1770	1850	
Volume (vph)	10	10	40	90	10	10	50	380	110	30	410	20
Peak-hour factor, PHF	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	14	14	55	129	14	14	57	437	126	33	456	22
RTOR Reduction (vph)	0	43	0	0	5	0	0	0	59	0	2	0
Lane Group Flow (vph)	0	40	0	0	152	0	57	437	67	33	476	0
Turn Type	Perm			Perm			Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		11.6			11.6		3.0	27.1	27.1	2.6	26.7	
Effective Green, g (s)		11.6			11.6		3.0	27.1	27.1	2.6	26.7	
Actuated g/C Ratio		0.22			0.22		0.06	0.51	0.51	0.05	0.50	
Clearance Time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		347			314		100	947	805	86	927	
v/s Ratio Prot							c0.03	0.23		0.02	c0.26	
v/s Ratio Perm		0.03			c0.11				0.04			
v/c Ratio		0.12			0.48		0.57	0.46	0.08	0.38	0.51	
Uniform Delay, d1		16.7			18.2		24.5	8.4	6.7	24.6	8.9	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			1.2		7.3	0.4	0.0	2.8	0.5	
Delay (s)		16.9			19.4		31.8	8.8	6.8	27.4	9.4	
Level of Service		B			B		C	A	A	C	A	
Approach Delay (s)		16.9			19.4			10.5			10.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	53.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		6%			-6%
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1744		1823	1919
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1744		1823	1919
Volume (vph)	80	110	260	90	90	250
Peak-hour factor, PHF	0.91	0.91	0.87	0.87	0.86	0.86
Adj. Flow (vph)	88	121	299	103	105	291
RTOR Reduction (vph)	0	101	19	0	0	0
Lane Group Flow (vph)	88	20	383	0	105	291
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	8.9	8.9	27.3		4.6	35.9
Effective Green, g (s)	8.9	8.9	27.3		4.6	35.9
Actuated g/C Ratio	0.17	0.17	0.52		0.09	0.68
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	298	267	902		159	1305
v/s Ratio Prot	c0.05		c0.22		c0.06	0.15
v/s Ratio Perm		0.01				
v/c Ratio	0.30	0.08	0.42		0.66	0.22
Uniform Delay, d1	19.2	18.5	7.9		23.3	3.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.1	0.3		9.8	0.1
Delay (s)	19.8	18.6	8.2		33.2	3.3
Level of Service	B	B	A		C	A
Approach Delay (s)	19.1		8.2			11.2
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			-5%			0%			4%	
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1758	1544		1833	1623	1770	1814		1734	1816	
Flt Permitted		0.77	1.00		0.74	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1395	1544		1412	1623	1770	1814		1734	1816	
Volume (vph)	20	10	60	50	10	10	90	240	50	10	270	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.74	0.74	0.74	0.84	0.84	0.84	0.83	0.84	0.83
Adj. Flow (vph)	22	11	67	68	14	14	107	286	60	12	321	12
RTOR Reduction (vph)	0	0	59	0	0	12	0	9	0	0	2	0
Lane Group Flow (vph)	0	33	8	0	82	2	107	337	0	12	331	0
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		7.0	7.0		7.0	7.0	4.0	35.8		1.0	32.8	
Effective Green, g (s)		7.0	7.0		7.0	7.0	4.0	35.8		1.0	32.8	
Actuated g/C Ratio		0.13	0.13		0.13	0.13	0.07	0.64		0.02	0.59	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		175	194		177	204	127	1164		31	1067	
v/s Ratio Prot							c0.06	c0.19		0.01	0.18	
v/s Ratio Perm		0.02	0.01		c0.06	0.00						
v/c Ratio		0.19	0.04		0.46	0.01	0.84	0.29		0.39	0.31	
Uniform Delay, d1		21.9	21.5		22.7	21.4	25.6	4.4		27.1	5.8	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.1		1.9	0.0	37.0	0.1		7.8	0.2	
Delay (s)		22.4	21.5		24.6	21.4	62.6	4.5		34.9	6.0	
Level of Service		C	C		C	C	E	A		C	A	
Approach Delay (s)		21.8			24.1			18.3			7.0	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2009 Conditions (with East Connector)**
Queue Length **Summer PM Peak**

Intersection 1 **SR 299/Glen Road** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	150	28	4	59	4	73	7	0	0
	Through	278	68	7	135	21	172	34	8	0
	Right Turn	50	22	4	**62**	7	**77**	2	0	0
SB	Left Turn	150	13	5	42	25	69	57	0	0
	Through	233	61	6	133	21	179	47	7	0
	Right Turn	50	14	4	**52**	12	**77**	5	0	0
EB	Left Turn	494	52	4	90	10	113	21	8	0
	Through	494	52	4	90	10	113	21	8	0
	Right Turn	50	19	4	**51**	10	**68**	15	0	0
WB	Left Turn	328	36	4	69	11	85	20	3	0
	Through	328	36	4	69	11	85	20	3	0
	Right Turn	50	7	3	28	7	36	12	0	0

Intersection 2 **SR 299/Washington St** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	26	3	58	4	80	24	0	0
	Through	590	57	6	131	14	180	29	2	0
	Right Turn	100	5	2	25	13	49	41	0	0
SB	Left Turn	100	22	5	52	9	71	30	0	0
	Through	637	63	7	132	14	168	20	2	0
	Right Turn	637	63	7	132	14	168	20	2	0
EB	Left Turn	214	30	4	54	7	63	11	0	0
	Through	214	30	4	54	7	63	11	0	0
	Right Turn	214	30	4	54	7	63	11	0	0
WB	Left Turn	300	25	4	55	9	73	14	0	0
	Through	300	25	4	55	9	73	14	0	0
	Right Turn	300	25	4	55	9	73	14	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2009 Conditions (with East Connector)**
Queue Length **Summer PM Peak**
Intersection 3 **SR 299-Reynolds Ranch Pkwy/SR 3** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn									
	Through	502	71	11	147	25	201	45	0	0
	Right Turn	502	71	11	147	25	201	45	0	0
SB	Left Turn	75	40	3	73	5	**85**	12	1	0
	Through	456	30	6	73	12	97	26	0	0
	Right Turn									
EB	Left Turn									
	Through									
	Right Turn									
WB	Left Turn	1,089	35	3	63	6	80	13	0	0
	Through									
	Right Turn	180	32	3	56	4	70	10	0	0

Intersection 4 **SR 299/Forest St** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	50	35	4	**67**	7	**76**	2	4	0
	Through	192	28	4	78	15	124	44	1	0
	Right Turn	192	28	4	78	15	124	44	1	0
SB	Left Turn	150	10	2	34	6	40	11	0	0
	Through	1,805	52	4	111	8	149	27	0	0
	Right Turn	1,805	52	4	111	8	149	27	0	0
EB	Left Turn	75	15	2	40	4	46	10	0	0
	Through	75	15	2	40	4	46	10	0	0
	Right Turn	393	22	2	45	3	54	10	0	0
WB	Left Turn	621	30	4	62	6	77	16	2	0
	Through	621	30	4	62	6	77	16	2	0
	Right Turn	50	9	2	33	6	45	22	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2040 Conditions (with East Connector)**
Queue Length **Summer PM Peak**

Intersection 1 **SR 299/Glen Rd** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	150	29	5	68	16	102	48	0	0
	Through	278	92	10	181	20	231	52	12	0
	Right Turn	50	31	5	**73**	6	**78**	1	0	0
SB	Left Turn	150	19	4	51	16	84	49	0	0
	Through	1,315	75	15	155	35	204	70	9	0
	Right Turn	50	15	3	**56**	7	**78**	1	0	0
EB	Left Turn	494	58	7	100	13	129	29	11	0
	Through	494	58	7	100	13	129	29	11	0
	Right Turn	50	20	3	**57**	8	**74**	8	0	0
WB	Left Turn	328	40	5	75	10	95	16	5	0
	Through	328	40	5	75	10	95	16	5	0
	Right Turn	50	14	3	42	5	**53**	19	0	0

Intersection 2 **SR 299/Washington St** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	36	6	76	14	**102**	31	0	0
	Through	590	90	11	202	34	289	70	4	0
	Right Turn	100	34	7	95	17	**130**	12	0	0
SB	Left Turn	100	24	5	61	14	92	32	0	0
	Through	637	92	8	185	25	257	47	5	0
	Right Turn	637	92	8	185	25	257	47	5	0
EB	Left Turn	214	29	5	58	8	68	14	0	0
	Through	214	29	5	58	8	68	14	0	0
	Right Turn	214	29	5	58	8	68	14	0	0
WB	Left Turn	300	51	5	92	10	120	23	0	0
	Through	300	51	5	92	10	120	23	0	0
	Right Turn	300	51	5	92	10	120	23	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2040 Conditions (with East Connector)**
Queue Length **Summer PM Peak**
Intersection 3 **SR 299/SR 3** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn									
	Through	502	77	7	152	15	208	35	0	0
	Right Turn	502	77	7	152	15	208	35	0	0
SB	Left Turn	75	49	5	**86**	8	**99**	12	2	0
	Through	456	42	5	94	14	138	29	1	0
	Right Turn									
EB	Left Turn									
	Through									
	Right Turn									
WB	Left Turn	1,089	40	2	75	9	93	27	0	0
	Through									
	Right Turn	180	38	3	61	5	70	8	0	0

Intersection 4 **SR 299/Forest Ave** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	50	41	5	**74**	7	**78**	2	6	0
	Through	192	39	12	94	23	139	38	2	0
	Right Turn	192	39	12	94	23	139	38	2	0
SB	Left Turn	150	8	2	30	4	33	0	0	0
	Through	1,805	66	9	132	25	172	65	1	0
	Right Turn	1,805	66	9	132	25	172	65	1	0
EB	Left Turn	75	18	3	45	3	53	11	0	0
	Through	75	18	3	45	3	53	11	0	0
	Right Turn	393	25	1	46	4	62	8	0	0
WB	Left Turn	621	34	6	65	7	80	17	3	0
	Through	621	34	6	65	7	80	17	3	0
	Right Turn	50	7	2	27	5	35	14	0	0

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	4.2	62.2	0.5	28
	1.6	16.4	0.1	26
East Connector Road	6.8	13.7	0.1	18
	1.4	9.0	0.1	24
Mountain View Street	2.4	28.2	0.2	28
Levee Road	1.0	9.3	0.1	26
Weaver Street	0.6	4.9	0.0	26
Washington Street	5.5	20.6	0.1	22
Mill Street	2.2	18.1	0.1	26
	0.8	8.1	0.1	27
Lorenz Street	1.6	15.8	0.1	28
SR 3	7.1	20.2	0.1	19
Court Street	2.0	14.0	0.1	25
Garden Gulch	3.4	9.2	0.0	19
Total	40.7	249.8	1.7	25

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	7.3	49.5	0.3	26
Court Street	1.4	7.5	0.0	23
SR 3	3.1	14.3	0.1	25
Lorenz Street	1.3	14.0	0.1	27
	1.1	16.6	0.1	27
Mill Street	0.9	8.0	0.1	28
	5.7	21.4	0.1	22
Weaver Street	2.1	17.0	0.1	27
Masonic Lane	0.8	5.3	0.0	24
Mountain View Street	0.8	9.1	0.1	27
	2.7	29.4	0.2	27
Glen Road	7.0	13.9	0.1	16
	1.6	10.2	0.1	24
Nugget Lane	1.2	14.2	0.1	30
Total	36.9	230.4	1.6	25

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	4.9	63.1	0.5	27
	1.9	16.6	0.1	26
East Connector Road	8.1	15.3	0.1	16
	1.5	9.2	0.1	24
Mountain View Street	2.8	28.4	0.2	28
Levee Road	1.3	9.7	0.1	25
Weaver Street	0.9	5.1	0.0	26
Washington Street	7.0	22.1	0.1	21
Mill Street	2.3	18.3	0.1	26
	0.8	8.2	0.1	27
Lorenz Street	1.7	15.8	0.1	29
SR 3	8.2	21.2	0.1	18
Court Street	2.3	14.3	0.1	25
Garden Gulch	4.3	10.2	0.0	17
Total	48.1	257.3	1.7	25

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	8.1	50.2	0.3	25
Court Street	1.6	7.7	0.0	23
SR 3	3.7	14.9	0.1	24
Lorenz Street	1.5	14.4	0.1	27
	1.3	16.9	0.1	27
Mill Street	1.0	8.2	0.1	27
	8.1	23.8	0.1	20
Weaver Street	2.5	17.3	0.1	26
Masonic Lane	1.1	5.6	0.0	24
Mountain View Street	0.9	9.1	0.1	27
	3.2	29.9	0.2	26
Glen Road	6.4	13.1	0.1	17
	1.7	10.2	0.1	23
Nugget Lane	1.4	15.3	0.1	28
Total	42.6	236.5	1.6	25

1: Glen Road & SR 299

Direction	All
Volume (vph)	1081
CO Emissions (kg)	1.01
NOx Emissions (kg)	0.20
VOC Emissions (kg)	0.23

2: Washington Street & SR 299

Direction	All
Volume (vph)	901
CO Emissions (kg)	0.56
NOx Emissions (kg)	0.11
VOC Emissions (kg)	0.13

3: SR 3 & SR 299

Direction	All
Volume (vph)	740
CO Emissions (kg)	0.50
NOx Emissions (kg)	0.10
VOC Emissions (kg)	0.12

4: Forest Ave & SR 299

Direction	All
Volume (vph)	690
CO Emissions (kg)	0.58
NOx Emissions (kg)	0.11
VOC Emissions (kg)	0.13

1: Glen Road & SR 299

Direction	All
Volume (vph)	1210
CO Emissions (kg)	1.14
NOx Emissions (kg)	0.22
VOC Emissions (kg)	0.27

2: Washington Street & SR 299

Direction	All
Volume (vph)	1171
CO Emissions (kg)	0.88
NOx Emissions (kg)	0.17
VOC Emissions (kg)	0.20

3: SR 3 & SR 299

Direction	All
Volume (vph)	880
CO Emissions (kg)	0.65
NOx Emissions (kg)	0.13
VOC Emissions (kg)	0.15

4: Forest Ave & SR 299

Direction	All
Volume (vph)	832
CO Emissions (kg)	0.70
NOx Emissions (kg)	0.14
VOC Emissions (kg)	0.16

ATTACHMENT D
SCENARIO 3: SIGNALIZED AND ROUNDABOUT INTERSECTIONS

MOVEMENT SUMMARY

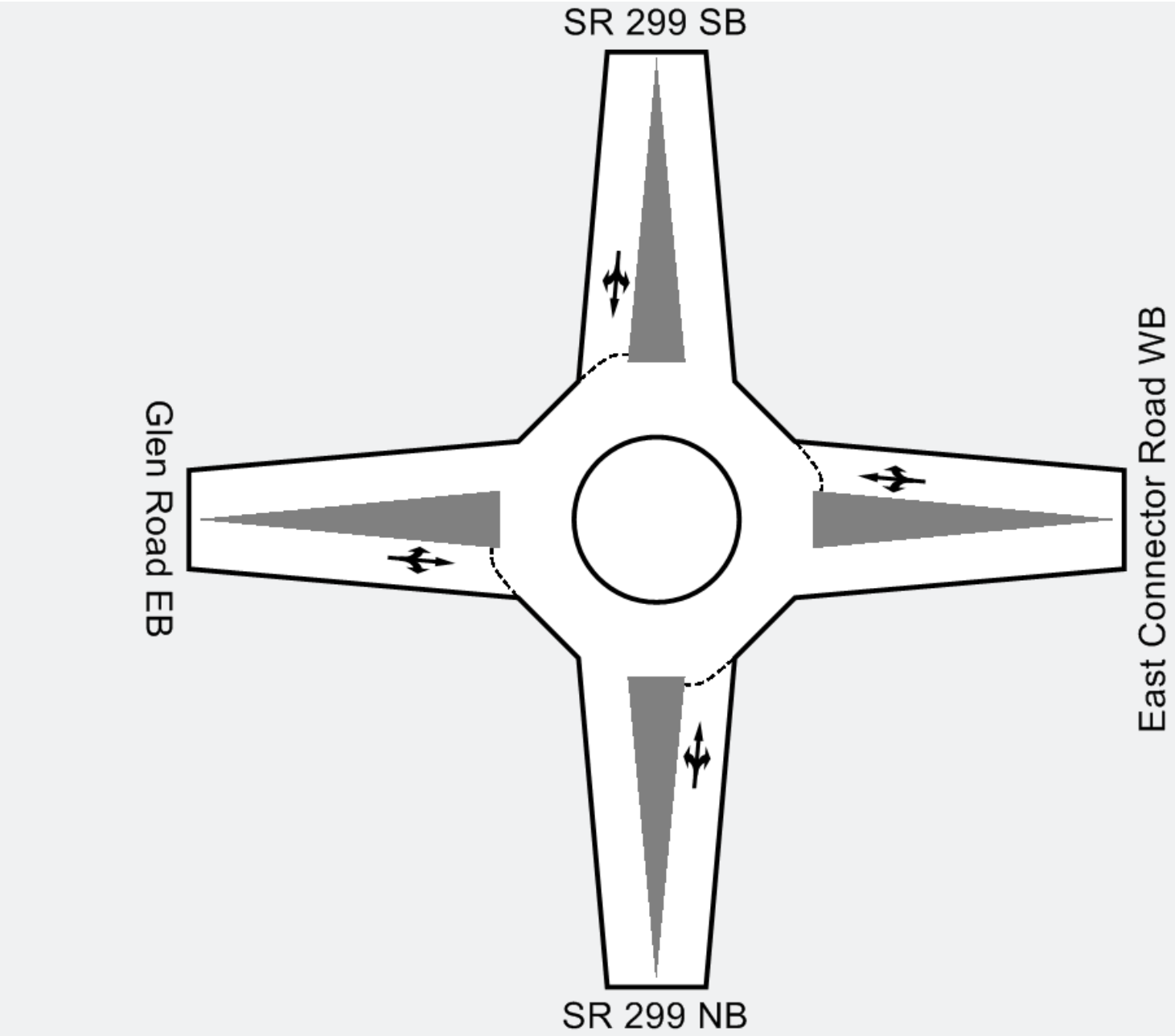
Site: SR 299/Glen Road/East Connector Road

Trinity County - 2009 Conditions (with East Connector) PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SR 299 NB											
3L	L	47	2.0	0.506	14.0	LOS B	4.9	123.8	0.57	0.81	29.6
8T	T	376	2.0	0.507	7.1	LOS A	4.9	123.8	0.57	0.58	31.5
8R	R	82	2.0	0.508	8.5	LOS A	4.9	123.8	0.57	0.64	31.4
Approach		506	2.0	0.507	8.0	LOS B	4.9	123.8	0.57	0.61	31.3
East: East Connector Road WB											
1L	L	71	2.0	0.165	16.5	LOS B	1.1	28.7	0.67	0.84	27.8
6T	T	24	2.0	0.165	9.6	LOS A	1.1	28.7	0.67	0.71	30.4
6R	R	12	2.0	0.166	10.9	LOS B	1.1	28.7	0.67	0.75	30.1
Approach		106	2.0	0.165	14.3	LOS B	1.1	28.7	0.67	0.80	28.5
North: SR 299 SB											
7L	L	24	2.0	0.444	13.5	LOS B	4.0	102.6	0.48	0.81	29.8
4T	T	365	2.0	0.446	6.7	LOS A	4.0	102.6	0.48	0.53	32.0
4R	R	82	2.0	0.448	8.0	LOS A	4.0	102.6	0.48	0.60	31.7
Approach		471	2.0	0.447	7.2	LOS B	4.0	102.6	0.48	0.55	31.8
West: Glen Road EB											
5L	L	118	2.0	0.267	16.0	LOS B	1.9	48.4	0.66	0.85	28.0
2T	T	35	2.0	0.267	9.2	LOS A	1.9	48.4	0.66	0.71	30.5
2R	R	35	2.0	0.267	10.5	LOS B	1.9	48.4	0.66	0.75	30.4
Approach		188	2.0	0.267	13.7	LOS B	1.9	48.4	0.66	0.80	28.8
All Vehicles		1271	2.0	0.507	9.1	LOS A	4.9	123.8	0.56	0.63	30.8

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.


SR 299 SB
Glen Road EB
East Connector Road WB
SR 299 NB

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1682			1760		1770	1863	1583	1770	1855	
Flt Permitted		0.96			0.90		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1629			1635		1770	1863	1583	1770	1855	
Volume (vph)	10	10	40	30	10	10	40	330	20	30	360	10
Peak-hour factor, PHF	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	14	14	55	43	14	14	46	379	23	33	400	11
RTOR Reduction (vph)	0	51	0	0	13	0	0	0	7	0	1	0
Lane Group Flow (vph)	0	32	0	0	58	0	46	379	16	33	410	0
Turn Type	Perm			Perm			Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		4.1			4.1		3.6	40.2	40.2	1.6	38.2	
Effective Green, g (s)		4.1			4.1		3.6	40.2	40.2	1.6	38.2	
Actuated g/C Ratio		0.07			0.07		0.06	0.69	0.69	0.03	0.66	
Clearance Time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		115			116		110	1293	1099	49	1224	
v/s Ratio Prot							c0.03	0.20		0.02	c0.22	
v/s Ratio Perm		0.02			c0.04				0.01			
v/c Ratio		0.28			0.50		0.42	0.29	0.01	0.67	0.34	
Uniform Delay, d1		25.5			25.9		26.1	3.4	2.7	27.9	4.3	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.3			3.4		2.6	0.1	0.0	30.8	0.2	
Delay (s)		26.8			29.3		28.7	3.5	2.7	58.7	4.5	
Level of Service		C			C		C	A	A	E	A	
Approach Delay (s)		26.8			29.3			6.1			8.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		6%			-6%
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1736		1823	1919
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1736		1823	1919
Volume (vph)	70	80	220	90	70	210
Peak-hour factor, PHF	0.91	0.91	0.87	0.87	0.86	0.86
Adj. Flow (vph)	77	88	253	103	81	244
RTOR Reduction (vph)	0	77	19	0	0	0
Lane Group Flow (vph)	77	11	337	0	81	244
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	6.6	6.6	30.9		4.1	39.0
Effective Green, g (s)	6.6	6.6	30.9		4.1	39.0
Actuated g/C Ratio	0.12	0.12	0.58		0.08	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	218	195	1001		139	1396
v/s Ratio Prot	c0.04		c0.19		c0.04	0.13
v/s Ratio Perm		0.01				
v/c Ratio	0.35	0.06	0.34		0.58	0.17
Uniform Delay, d1	21.5	20.7	6.0		23.9	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	0.1	0.2		6.1	0.1
Delay (s)	22.5	20.9	6.2		30.0	2.3
Level of Service	C	C	A		C	A
Approach Delay (s)	21.6		6.2			9.2
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

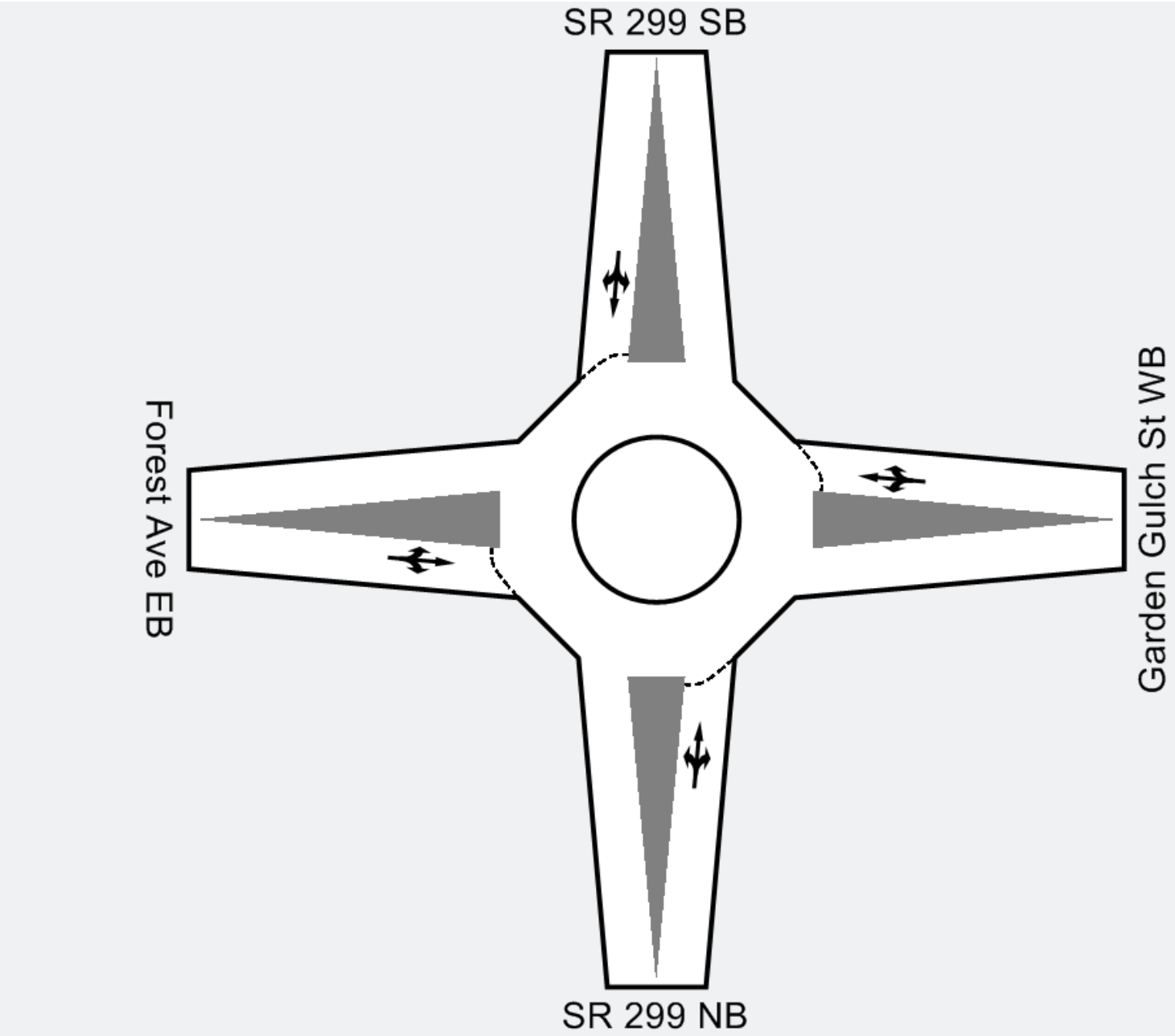
Site: SR 299/Garden Gulch Street

Trinity County - 2009 Conditions (with East Connector) PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SR 299 NB											
3L	L	89	2.0	0.265	12.5	LOS B	2.1	52.3	0.19	0.83	29.9
8T	T	211	2.0	0.266	5.2	LOS A	2.1	52.3	0.19	0.38	33.8
8R	R	44	2.0	0.266	6.7	LOS A	2.1	52.3	0.19	0.50	32.9
Approach		344	2.0	0.266	7.3	LOS B	2.1	52.3	0.19	0.51	32.5
East: Garden Gulch St WB											
1L	L	48	2.0	0.084	14.3	LOS B	0.5	13.2	0.48	0.75	29.0
6T	T	12	2.0	0.084	7.1	LOS A	0.5	13.2	0.48	0.52	31.6
6R	R	12	2.0	0.084	8.5	LOS A	0.5	13.2	0.48	0.59	31.3
Approach		71	2.0	0.084	12.2	LOS B	0.5	13.2	0.48	0.68	29.7
North: SR 299 SB											
7L	L	14	2.0	0.322	13.4	LOS B	2.5	62.5	0.41	0.86	29.9
4T	T	311	2.0	0.324	6.2	LOS A	2.5	62.5	0.41	0.50	32.6
4R	R	14	2.0	0.322	7.6	LOS A	2.5	62.5	0.41	0.59	32.2
Approach		338	2.0	0.324	6.5	LOS B	2.5	62.5	0.41	0.52	32.5
West: Forest Ave EB											
5L	L	12	2.0	0.107	14.8	LOS B	0.7	17.6	0.54	0.81	28.9
2T	T	12	2.0	0.107	7.6	LOS A	0.7	17.6	0.54	0.58	31.5
2R	R	60	2.0	0.107	9.0	LOS A	0.7	17.6	0.54	0.64	31.3
Approach		84	2.0	0.107	9.6	LOS B	0.7	17.6	0.54	0.66	30.9
All Vehicles		838	2.0	0.324	7.6	LOS A	2.5	62.5	0.34	0.54	32.1

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.


SR 299 SB
Forest Ave EB
Garden Gulch St WB
SR 299 NB

MOVEMENT SUMMARY

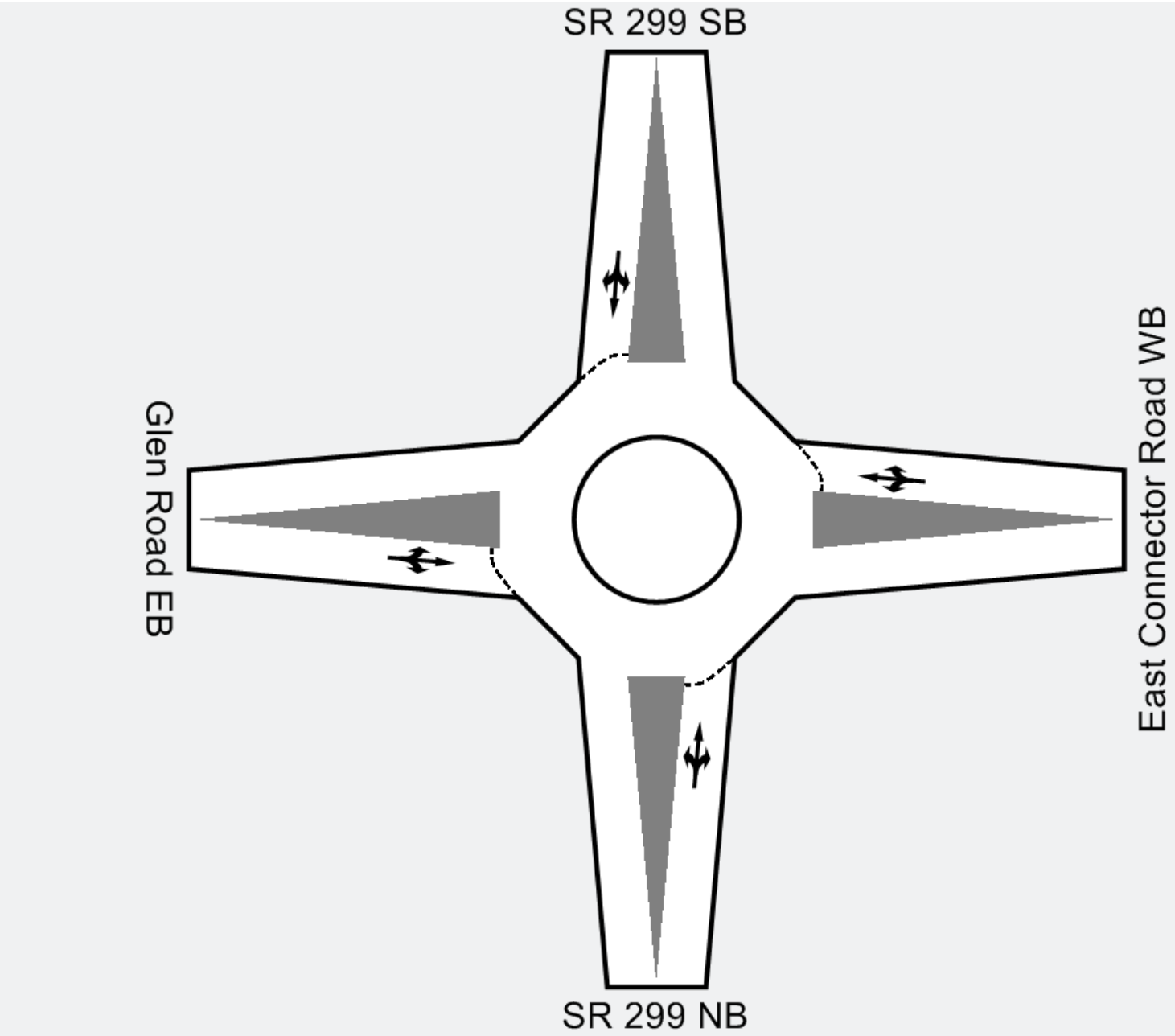
Site: SR 299/Glen Road/East Connector Road

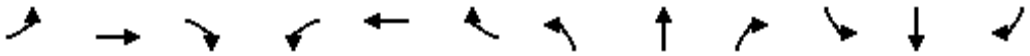
Trinity County - 2040 Conditions (with East Connector) PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SR 299 NB											
3L	L	47	2.0	0.581	14.3	LOS B	6.1	154.1	0.64	0.80	29.5
8T	T	424	2.0	0.583	7.4	LOS A	6.1	154.1	0.64	0.61	31.1
8R	R	106	2.0	0.582	8.8	LOS A	6.1	154.1	0.64	0.66	31.1
Approach		576	2.0	0.582	8.2	LOS B	6.1	154.1	0.64	0.64	31.0
East: East Connector Road WB											
1L	L	94	2.0	0.234	17.1	LOS B	1.7	42.7	0.72	0.88	27.4
6T	T	24	2.0	0.233	10.3	LOS B	1.7	42.7	0.72	0.77	29.9
6R	R	24	2.0	0.233	11.6	LOS B	1.7	42.7	0.72	0.80	29.6
Approach		141	2.0	0.234	15.1	LOS B	1.7	42.7	0.72	0.85	28.1
North: SR 299 SB											
7L	L	35	2.0	0.504	13.9	LOS B	4.9	124.2	0.55	0.81	29.7
4T	T	412	2.0	0.508	7.0	LOS A	4.9	124.2	0.55	0.57	31.6
4R	R	71	2.0	0.508	8.3	LOS A	4.9	124.2	0.55	0.63	31.5
Approach		518	2.0	0.507	7.7	LOS B	4.9	124.2	0.55	0.59	31.5
West: Glen Road EB											
5L	L	118	2.0	0.293	16.9	LOS B	2.1	54.3	0.72	0.88	27.6
2T	T	35	2.0	0.294	10.0	LOS B	2.1	54.3	0.72	0.77	30.1
2R	R	35	2.0	0.294	11.4	LOS B	2.1	54.3	0.72	0.80	29.8
Approach		188	2.0	0.293	14.6	LOS B	2.1	54.3	0.72	0.85	28.4
All Vehicles		1424	2.0	0.582	9.5	LOS A	6.1	154.1	0.63	0.67	30.5

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.


SR 299 SB
Glen Road EB
East Connector Road WB
SR 299 NB



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1682			1768		1770	1863	1583	1770	1850	
Flt Permitted		0.94			0.78		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1596			1442		1770	1863	1583	1770	1850	
Volume (vph)	10	10	40	90	10	10	50	380	110	30	410	20
Peak-hour factor, PHF	0.73	0.73	0.73	0.70	0.70	0.70	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	14	14	55	129	14	14	57	437	126	33	456	22
RTOR Reduction (vph)	0	43	0	0	5	0	0	0	59	0	2	0
Lane Group Flow (vph)	0	40	0	0	152	0	57	437	67	33	476	0
Turn Type	Perm			Perm			Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		11.6			11.6		3.0	27.1	27.1	2.6	26.7	
Effective Green, g (s)		11.6			11.6		3.0	27.1	27.1	2.6	26.7	
Actuated g/C Ratio		0.22			0.22		0.06	0.51	0.51	0.05	0.50	
Clearance Time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		347			314		100	947	805	86	927	
v/s Ratio Prot							c0.03	0.23		0.02	c0.26	
v/s Ratio Perm		0.03			c0.11				0.04			
v/c Ratio		0.12			0.48		0.57	0.46	0.08	0.38	0.51	
Uniform Delay, d1		16.7			18.2		24.5	8.4	6.7	24.6	8.9	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			1.2		7.3	0.4	0.0	2.8	0.5	
Delay (s)		16.9			19.4		31.8	8.8	6.8	27.4	9.4	
Level of Service		B			B		C	A	A	C	A	
Approach Delay (s)		16.9			19.4			10.5			10.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	53.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		6%			-6%
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1744		1823	1919
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1744		1823	1919
Volume (vph)	80	110	260	90	90	250
Peak-hour factor, PHF	0.91	0.91	0.87	0.87	0.86	0.86
Adj. Flow (vph)	88	121	299	103	105	291
RTOR Reduction (vph)	0	101	19	0	0	0
Lane Group Flow (vph)	88	20	383	0	105	291
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	8.9	8.9	27.3		4.6	35.9
Effective Green, g (s)	8.9	8.9	27.3		4.6	35.9
Actuated g/C Ratio	0.17	0.17	0.52		0.09	0.68
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	298	267	902		159	1305
v/s Ratio Prot	c0.05		c0.22		c0.06	0.15
v/s Ratio Perm		0.01				
v/c Ratio	0.30	0.08	0.42		0.66	0.22
Uniform Delay, d1	19.2	18.5	7.9		23.3	3.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.1	0.3		9.8	0.1
Delay (s)	19.8	18.6	8.2		33.2	3.3
Level of Service	B	B	A		C	A
Approach Delay (s)	19.1		8.2			11.2
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

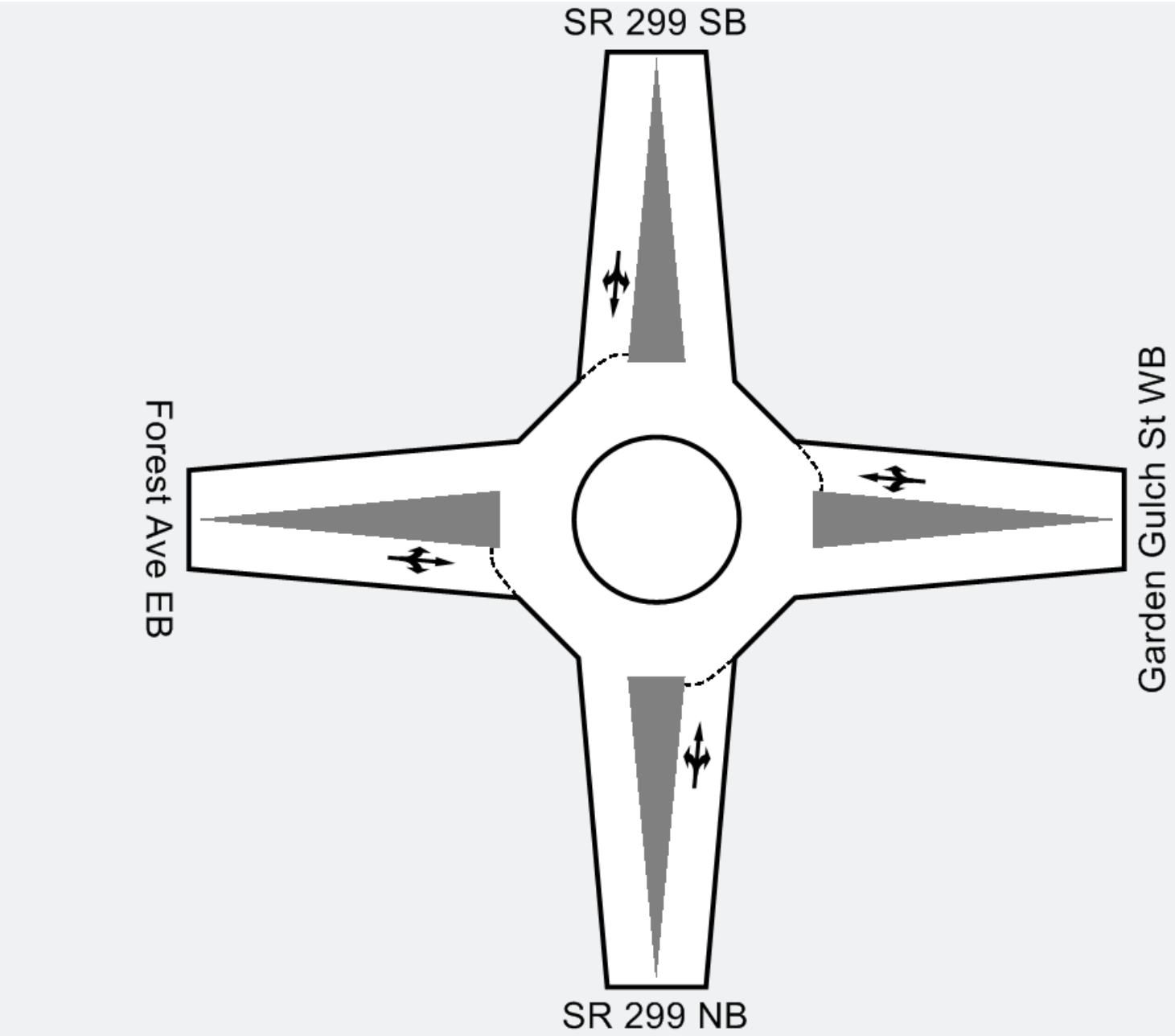
Site: SR 299/Garden Gulch Street

Trinity County - 2040 Conditions (with East Connector) PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SR 299 NB											
3L	L	100	2.0	0.332	12.6	LOS B	2.8	71.4	0.24	0.81	29.9
8T	T	267	2.0	0.332	5.3	LOS A	2.8	71.4	0.24	0.39	33.5
8R	R	56	2.0	0.333	6.8	LOS A	2.8	71.4	0.24	0.51	32.7
Approach		422	2.0	0.332	7.2	LOS B	2.8	71.4	0.24	0.51	32.4
East: Garden Gulch St WB											
1L	L	60	2.0	0.106	15.0	LOS B	0.7	17.1	0.54	0.77	28.6
6T	T	12	2.0	0.106	7.7	LOS A	0.7	17.1	0.54	0.57	31.2
6R	R	12	2.0	0.106	9.2	LOS A	0.7	17.1	0.54	0.64	31.0
Approach		83	2.0	0.106	13.1	LOS B	0.7	17.1	0.54	0.72	29.2
North: SR 299 SB											
7L	L	14	2.0	0.386	13.7	LOS B	3.1	78.6	0.47	0.86	29.8
4T	T	365	2.0	0.385	6.5	LOS A	3.1	78.6	0.47	0.53	32.3
4R	R	14	2.0	0.386	7.9	LOS A	3.1	78.6	0.47	0.62	32.0
Approach		392	2.0	0.385	6.8	LOS B	3.1	78.6	0.47	0.55	32.2
West: Forest Ave EB											
5L	L	24	2.0	0.147	15.4	LOS B	1.0	25.1	0.60	0.83	28.5
2T	T	12	2.0	0.147	8.2	LOS A	1.0	25.1	0.60	0.63	31.1
2R	R	72	2.0	0.147	9.6	LOS A	1.0	25.1	0.60	0.69	31.0
Approach		108	2.0	0.147	10.8	LOS B	1.0	25.1	0.60	0.71	30.4
All Vehicles		1006	2.0	0.385	7.9	LOS A	3.1	78.6	0.39	0.56	31.8

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.


SR 299 SB
Forest Ave EB
Garden Gulch St WB
SR 299 NB

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2009 Conditions (with East Connector)**
Queue Length **Summer PM Peak**

Intersection 1 **SR 299/Glen Road** **Unsignalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	188	51	5	100	10	118	18	0	0
	Through	188	51	5	100	10	118	18	0	0
	Right Turn	188	51	5	100	10	118	18	0	0
SB	Left Turn	159	43	10	90	19	128	52	0	0
	Through	159	43	10	90	19	128	52	0	0
	Right Turn	159	43	10	90	19	128	52	0	0
EB	Left Turn	403	35	6	67	8	77	11	0	0
	Through	403	35	6	67	8	77	11	0	0
	Right Turn	403	35	6	67	8	77	11	0	0
WB	Left Turn	248	24	3	53	3	62	13	0	0
	Through	248	24	3	53	3	62	13	0	0
	Right Turn	248	24	3	53	3	62	13	0	0

Intersection 2 **SR 299/Washington Street** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	27	4	59	7	78	28	0	0
	Through	590	54	9	121	17	160	30	1	0
	Right Turn	100	5	3	30	17	62	42	0	0
SB	Left Turn	100	25	5	58	11	77	31	0	0
	Through	637	58	9	130	27	170	54	1	0
	Right Turn	637	58	9	130	27	170	54	1	0
EB	Left Turn	214	28	4	56	8	69	15	0	0
	Through	214	28	4	56	8	69	15	0	0
	Right Turn	214	28	4	56	8	69	15	0	0
WB	Left Turn	300	28	3	57	7	76	18	0	0
	Through	300	28	3	57	7	76	18	0	0
	Right Turn	300	28	3	57	7	76	18	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2009 Conditions (with East Connector)**
Queue Length **Summer PM Peak**
Intersection 3 **SR 299/SR 3** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn									
	Through	502	67	7	143	18	178	29	0	0
	Right Turn	502	67	7	143	18	178	29	0	0
SB	Left Turn	75	39	4	72	9	**84**	12	1	0
	Through	456	29	5	73	8	96	18	1	0
	Right Turn									
EB	Left Turn									
	Through									
	Right Turn									
WB	Left Turn	1,089	36	3	66	6	82	13	0	0
	Through									
	Right Turn	180	32	3	57	7	71	13	0	0

Intersection 4 **SR 299/Forest Avenue** **Unsignalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	16	4	50	7	62	10	0	0
	Through	100	16	4	50	7	62	10	0	0
	Right Turn	100	16	4	50	7	62	10	0	0
SB	Left Turn	1,708	29	5	66	5	79	14	0	0
	Through	1,708	29	5	66	5	79	14	0	0
	Right Turn	1,708	29	5	66	5	79	14	0	0
EB	Left Turn	301	13	5	40	8	49	12	0	0
	Through	301	13	5	40	8	49	12	0	0
	Right Turn	301	13	5	40	8	49	12	0	0
WB	Left Turn	519	11	4	40	11	56	23	0	0
	Through	519	11	4	40	11	56	23	0	0
	Right Turn	519	11	4	40	11	56	23	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2040 Conditions (with East Connector)**
Queue Length **Summer PM Peak**

Intersection 1 **SR 299/Glen Road** **Unsignalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	754	57	5	108	15	143	44	0	0
	Through	188	57	5	108	15	143	44	0	0
	Right Turn	188	57	5	108	15	143	44	0	0
SB	Left Turn	1,241	48	5	96	14	136	43	0	0
	Through	159	48	5	96	14	136	43	0	0
	Right Turn	159	48	5	96	14	136	43	0	0
EB	Left Turn	403	35	5	68	11	79	27	0	0
	Through	403	35	5	68	11	79	27	0	0
	Right Turn	403	35	5	68	11	79	27	0	0
WB	Left Turn	248	31	3	63	9	75	25	0	0
	Through	248	31	3	63	9	75	25	0	0
	Right Turn	248	31	3	63	9	75	25	0	0

Intersection 2 **SR 299/Washington Street** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	35	4	70	9	84	29	0	0
	Through	590	79	14	176	41	248	81	3	0
	Right Turn	100	28	5	79	14	**122**	13	0	0
SB	Left Turn	100	24	4	59	9	85	30	0	0
	Through	637	88	12	173	30	222	47	4	0
	Right Turn	637	88	12	173	30	222	47	4	0
EB	Left Turn	214	29	2	57	5	70	13	0	0
	Through	214	29	2	57	5	70	13	0	0
	Right Turn	214	29	2	57	5	70	13	0	0
WB	Left Turn	300	46	3	81	9	98	22	0	0
	Through	300	46	3	81	9	98	22	0	0
	Right Turn	300	46	3	81	9	98	22	0	0

SimTraffic Post-Processor **Trinity County**
Average Results from 10 Runs **2040 Conditions (with East Connector)**
Queue Length **Summer PM Peak**
Intersection 3 **SR 299/SR 3** **Signalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn									
	Through	502	79	13	160	25	199	43	0	0
	Right Turn	502	79	13	160	25	199	43	0	0
SB	Left Turn	75	48	4	**84**	7	**103**	14	2	0
	Through	456	40	8	91	17	146	36	1	0
	Right Turn									
EB	Left Turn									
	Through									
	Right Turn									
WB	Left Turn	1,089	41	3	76	7	95	11	0	0
	Through									
	Right Turn	180	38	4	65	8	87	24	0	0

Intersection 4 **SR 299/Forest Ave** **Unsignalized**

Direction	Movement	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time %	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Left Turn	100	23	5	63	9	78	14	0	0
	Through	100	23	5	63	9	78	14	0	0
	Right Turn	100	23	5	63	9	78	14	0	0
SB	Left Turn	1,708	35	6	75	8	93	22	0	0
	Through	1,708	35	6	75	8	93	22	0	0
	Right Turn	1,708	35	6	75	8	93	22	0	0
EB	Left Turn	301	20	2	52	5	68	15	0	0
	Through	301	20	2	52	5	68	15	0	0
	Right Turn	301	20	2	52	5	68	15	0	0
WB	Left Turn	519	16	4	47	7	61	19	0	0
	Through	519	16	4	47	7	61	19	0	0
	Right Turn	519	16	4	47	7	61	19	0	0

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	4.1	62.7	0.5	28
	1.7	16.5	0.1	26
East Connector Road	5.1	10.2	0.1	25
	0.5	17.7	0.1	12
Mountain View Street	1.9	27.8	0.2	28
Levee Road	0.9	9.3	0.1	26
Weaver Street	0.6	4.9	0.0	27
Washington Street	5.0	20.1	0.1	23
Mill Street	2.2	18.1	0.1	26
	0.8	8.2	0.1	27
Lorenz Street	1.6	15.9	0.1	28
SR 3	6.9	20.0	0.1	19
Court Street	2.6	14.6	0.1	24
Garden Gulch	3.2	6.7	0.0	26
Total	37.1	252.7	1.7	25

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	5.8	45.6	0.3	28
Court Street	0.5	15.5	0.0	11
SR 3	2.6	13.9	0.1	25
Lorenz Street	1.2	13.9	0.1	28
	1.1	16.7	0.1	27
Mill Street	0.9	8.0	0.1	28
	5.1	20.7	0.1	23
Weaver Street	2.1	17.0	0.1	27
Masonic Lane	0.8	5.3	0.0	25
Mountain View Street	0.8	9.1	0.1	27
	3.0	29.6	0.2	26
Glen Road	4.6	9.4	0.1	23
	0.5	19.7	0.1	12
Nugget Lane	0.8	14.0	0.1	31
Total	29.9	238.4	1.6	24

Arterial Level of Service: NB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Martin Road	4.7	62.9	0.5	28
	2.0	16.8	0.1	26
East Connector Road	5.7	10.8	0.1	24
	0.5	17.7	0.1	12
Mountain View Street	2.1	27.6	0.2	28
Levee Road	1.1	9.5	0.1	26
Weaver Street	0.8	5.0	0.0	27
Washington Street	6.9	22.0	0.1	21
Mill Street	2.3	18.2	0.1	26
	0.9	8.2	0.1	27
Lorenz Street	1.8	15.8	0.1	28
SR 3	8.2	21.2	0.1	18
Court Street	2.9	14.9	0.1	24
Garden Gulch	3.4	6.9	0.0	26
Total	43.3	257.6	1.7	25

Arterial Level of Service: SB SR 299

Cross Street	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Forest Ave	6.4	46.5	0.3	27
Court Street	0.7	15.3	0.0	12
SR 3	3.2	14.5	0.1	24
Lorenz Street	1.4	14.4	0.1	27
	1.2	16.8	0.1	27
Mill Street	1.0	8.1	0.1	27
	7.6	23.3	0.1	20
Weaver Street	2.5	17.3	0.1	26
Masonic Lane	1.0	5.4	0.0	25
Mountain View Street	0.9	9.1	0.1	27
	3.5	30.2	0.2	26
Glen Road	4.3	9.1	0.1	24
	0.6	19.8	0.1	12
Nugget Lane	1.0	14.7	0.1	29
Total	35.1	244.6	1.6	24

1: Glen Road & SR 299

Direction	All
Volume (vph)	1080
CO Emissions (kg)	1.03
NOx Emissions (kg)	0.20
VOC Emissions (kg)	0.24

2: Washington Street & SR 299

Direction	All
Volume (vph)	901
CO Emissions (kg)	0.56
NOx Emissions (kg)	0.11
VOC Emissions (kg)	0.13

3: SR 3 & SR 299

Direction	All
Volume (vph)	740
CO Emissions (kg)	0.50
NOx Emissions (kg)	0.10
VOC Emissions (kg)	0.12

4: Forest Ave & SR 299

Direction	All
Volume (vph)	691
CO Emissions (kg)	0.60
NOx Emissions (kg)	0.12
VOC Emissions (kg)	0.14

1: Glen Road & SR 299

Direction	All
Volume (vph)	1211
CO Emissions (kg)	1.15
NOx Emissions (kg)	0.22
VOC Emissions (kg)	0.27

2: Washington Street & SR 299

Direction	All
Volume (vph)	1171
CO Emissions (kg)	0.87
NOx Emissions (kg)	0.17
VOC Emissions (kg)	0.20

3: SR 3 & SR 299

Direction	All
Volume (vph)	880
CO Emissions (kg)	0.65
NOx Emissions (kg)	0.13
VOC Emissions (kg)	0.15

4: Forest Ave & SR 299

Direction	All
Volume (vph)	832
CO Emissions (kg)	0.71
NOx Emissions (kg)	0.14
VOC Emissions (kg)	0.17

ATTACHMENT E
TRAFFIC VIBRATION ASSESSMENT: TRINITY COUNTY INTERSECTION IMPROVEMENTS

Traffic Vibration Assessment

Trinity County Intersection Improvements

Weaverville, California (Trinity County)

BAC Job #2009-028

Prepared For:

Fehr & Peers

Attn: Katy Cole
50 West Liberty Street, Suite 1090
Reno, California 89501

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

August 1, 2010

BOLLARD
Acoustical Consultants

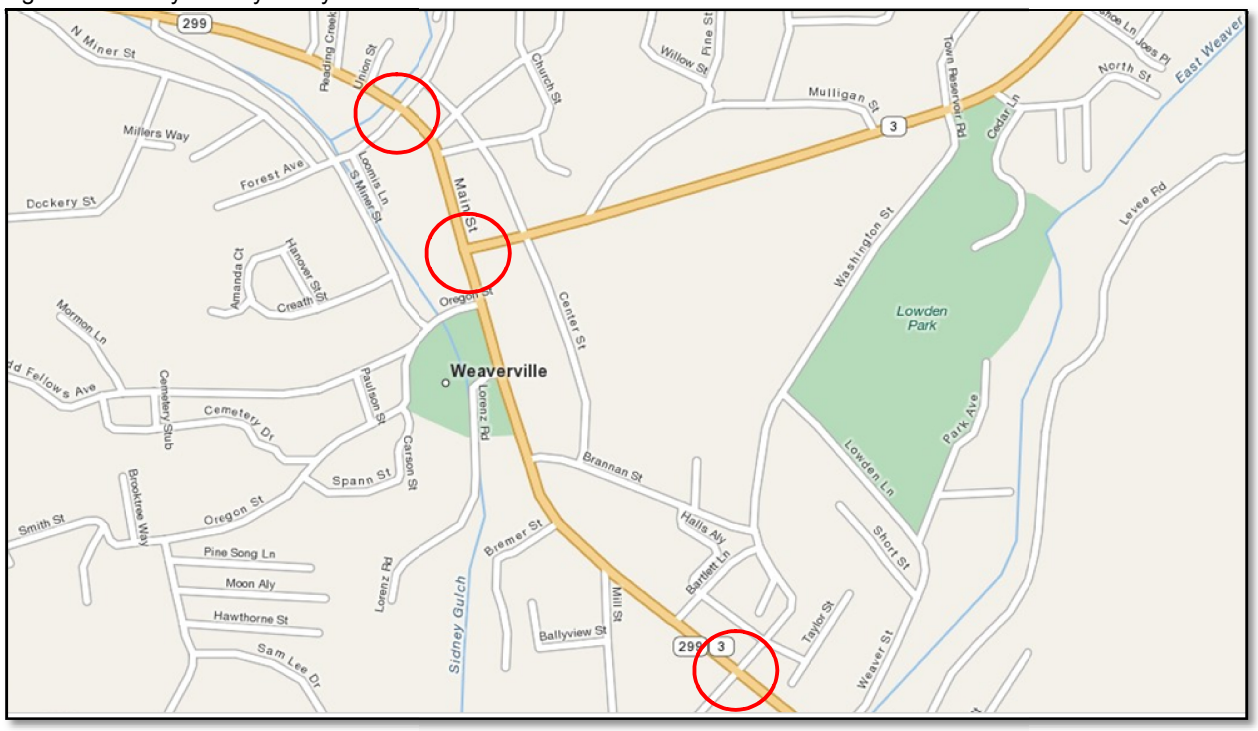
INTRODUCTION

Trinity County is considering improvements to three intersections in the town of Weaverville, California. Those intersections are as follows:

- State Route 299 / Washington Street
- State Route 299 / State Route 3
- State Route 299 / Forest Avenue

Currently, there are no controls on State Route 299, with stop signs controlling traffic on the roadways which intersect that route. The improvements being considered consist of signalization of the intersections identified above. The locations of the subject intersections are identified on Figure 1.

Figure 1 – Trinity County Study Intersections



One effect of the intersection signalization would be that heavy trucks passing through Weaverville on SR 299 which currently do not stop would occasionally be required to stop for red lights. Trinity County has expressed concerns that the acceleration and deceleration of heavy trucks on SR 299 at future signalized intersections where trucks are currently not required to stop may result in adverse vibration generation at nearby businesses. In response to these concerns, the acoustic and vibration consulting firm of Bollard Acoustical Consultants, Inc. (BAC) was retained by Fehr & Peers Associates, Transportation Engineers to conduct a vibration analysis of the intersections in question. This report contains the results of that analysis.

VIBRATION TERMINOLOGY

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to vibration will depend on their individual sensitivity, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second (ppv in/sec). Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

CRITERIA FOR ACCEPTABLE VIBRATION EXPOSURE

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration of excitation, and the number of perceived vibration events. Table 1, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second. Table 1 indicates that the threshold for damage to structures ranges from 2 to 6 in/sec. One-half this minimum threshold, or 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The threshold at which human annoyance could occur is 0.1 in/sec p.p.v.

Table 1
Effects of Various Vibration Levels on People and Buildings

Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0-.006	Imperceptible by people	Vibrations unlikely to cause damage of any type
.006-.02	Range of Threshold of perception	Vibrations unlikely to cause damage of any type
.08	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected
0.1	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings
0.2	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
1.0		Architectural Damage
2.0		Structural Damage to Residential Buildings
6.0		Structural Damage to Commercial Buildings

Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans 1976.

EVALUATION OF TRAFFIC VIBRATION LEVELS

To quantify traffic vibration levels in the City of Weaverville, BAC conducted vibration measurements of several automobile and heavy truck passages at the intersection if SR-299 and SR-3 on the afternoon of Thursday July 15, 2010. BAC also intended to conduct similar measurements at the two other study intersections, but the results of the measurements conducted at the SR-3 / SR-288 intersection rendered those additional measurements unnecessary (additional explanation is provided below). The vibration measurements consisted of peak particle velocity sampling at the edge of roadway, approximately 15 feet from near lane traffic, and 30 feet from far lane traffic.

The measurements were conducted using a Larson-Davis Laboratories Model HVM-100 Vibration Analyzer with a PCB Electronics Model 353B51 ICP Vibration Transducer. The test system is a Type I instrument designed for use in assessing vibration as perceived by human beings, and meets the full requirements of ISO 8041:1990(E). Atmospheric conditions present during the tests were within the operating parameters of the instrument. A photograph of the vibration measurement setup is provided in Figure 2. A summary of the vibration measurement results is provided in Table 2.

Figure 2 – Vibration Monitoring Equipment Setup

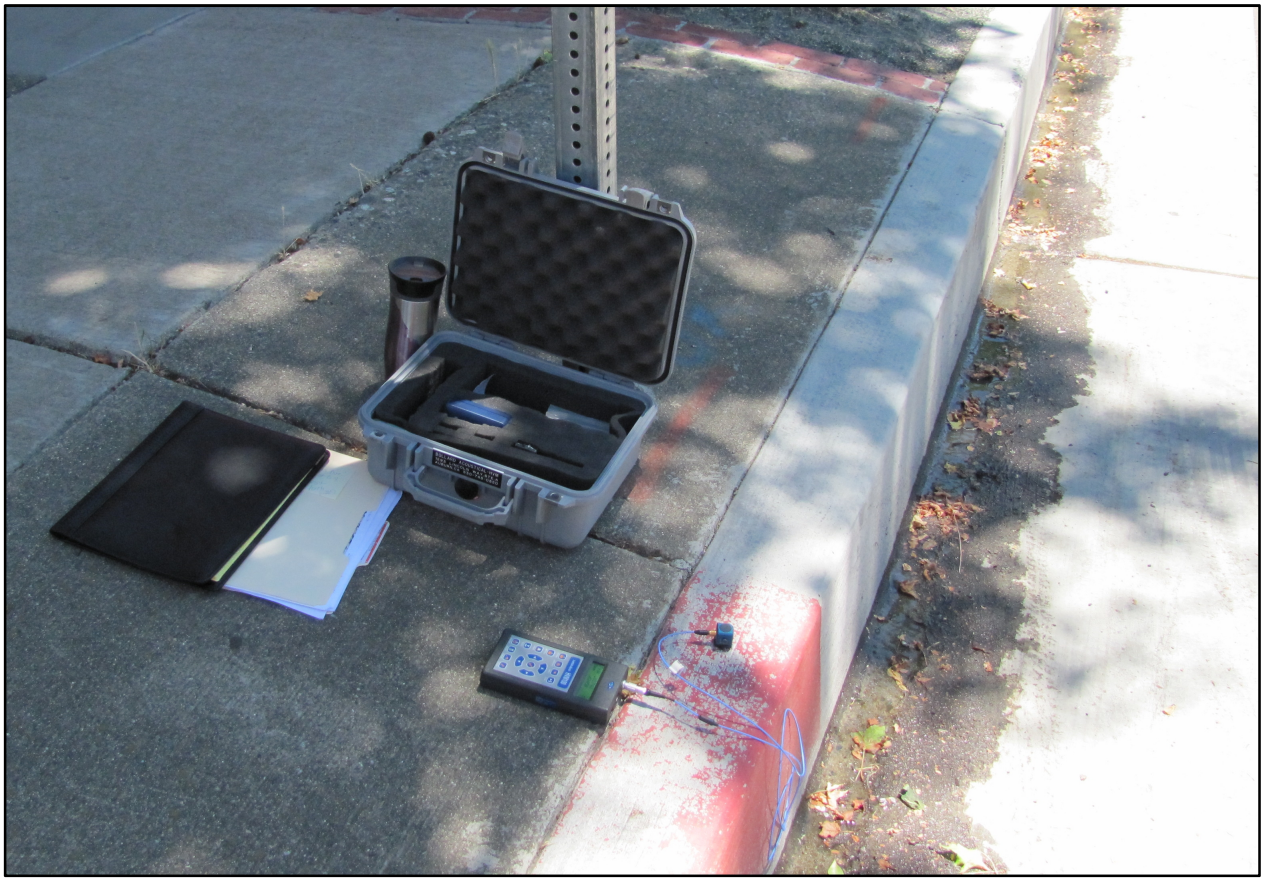


Table 2
Vibration Measurement Results
SR-299 / SR-4 Intersection - Weaverville, California
July 15, 2010

Vehicle	Operation[1]	Distance (ft)	Peak Particle Velocity (in./sec.)
None – Ambient	n/a	n/a	0.0069
Auto	c	15	0.0072
Logging Truck	c	30	0.0215
None – Ambient	n/a	n/a	0.0069
Auto	a	15	0.0078
Logging Truck	a	15	0.0672
Auto	d	30	0.0071
None – Ambient	n/a	n/a	0.0069
Logging Truck	d	30	0.0226
Logging Truck	d	30	0.0318
Heavy truck	a	15	0.0439
Motorcycle	a	15	0.0082
None – Ambient	n/a	n/a	0.0069
Heavy Truck	c	15	0.0187
Logging Truck	c	30	0.0122
Fire Engine	a	15	0.0087
Large RV	a	15	0.0087

1. A = Accelerating, D = Decelerating, C = Constant Speed
Source: Bollard Acoustical Consultants

Comparison of the Table 2 data against the Table 1 vibration thresholds indicates that the measured vibration levels were below the thresholds of human perception and well below levels required to result in damage to structures. In addition, there were no appreciable differences in measured vibration levels between heavy trucks accelerating, decelerating, or moving through the study intersection at constant speeds. As a result of the very low vibration levels measured at the intersection of SR-3 & SR-299, it was determined that additional monitoring of similar vehicles at the two other study intersections in Weaverville were not warranted.

CONCLUSIONS

Due to the very low levels of vibration measured in close proximity to heavy trucks accelerating, decelerating, and passing the monitoring site at constant speed, this analysis concludes that the introduction of traffic controls at any of the three (3) subject intersections in Weaverville would not result in appreciable changes in vibration levels at existing structures located near those intersections, and that resulting vibration levels would be well below levels required for annoyance to humans or damage to structures.

ATTACHMENT F
CENTER STREET CONVERSION ANALYSIS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	68	43	214	90	68	201
Peak Hour Factor	0.91	0.91	0.87	0.87	0.86	0.86
Hourly flow rate (vph)	75	47	246	103	79	234
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	690	298			349	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	690	298			349	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	94			93	
cM capacity (veh/h)	384	742			1209	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	75	47	349	79	234
Volume Left	75	0	0	79	0
Volume Right	0	47	103	0	0
cSH	384	742	1700	1209	1700
Volume to Capacity	0.19	0.06	0.21	0.07	0.14
Queue Length 95th (ft)	18	5	0	5	0
Control Delay (s)	16.6	10.2	0.0	8.2	0.0
Lane LOS	C	B		A	
Approach Delay (s)	14.1		0.0	2.1	
Approach LOS	B				

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	70	45	215	95	70	210
Peak Hour Factor	0.91	0.91	0.87	0.87	0.86	0.86
Hourly flow rate (vph)	77	49	247	109	81	244
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		7				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	709	302			356	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	709	302			356	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	93			93	
cM capacity (veh/h)	374	738			1202	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	126	356	81	244
Volume Left	77	0	81	0
Volume Right	49	109	0	0
cSH	614	1700	1202	1700
Volume to Capacity	0.21	0.21	0.07	0.14
Queue Length 95th (ft)	19	0	5	0
Control Delay (s)	14.4	0.0	8.2	0.0
Lane LOS	B		A	
Approach Delay (s)	14.4	0.0	2.1	
Approach LOS	B			

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		6%			-6%
Volume (veh/h)	80	85	255	95	90	250
Peak Hour Factor	0.91	0.91	0.87	0.87	0.86	0.86
Hourly flow rate (vph)	88	93	293	109	105	291
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		7				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	848	348			402	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	848	348			402	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	87			91	
cM capacity (veh/h)	302	695			1156	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	181	402	105	291
Volume Left	88	0	105	0
Volume Right	93	109	0	0
cSH	623	1700	1156	1700
Volume to Capacity	0.29	0.24	0.09	0.17
Queue Length 95th (ft)	30	0	7	0
Control Delay (s)	16.2	0.0	8.4	0.0
Lane LOS	C		A	
Approach Delay (s)	16.2	0.0	2.2	
Approach LOS	C			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		